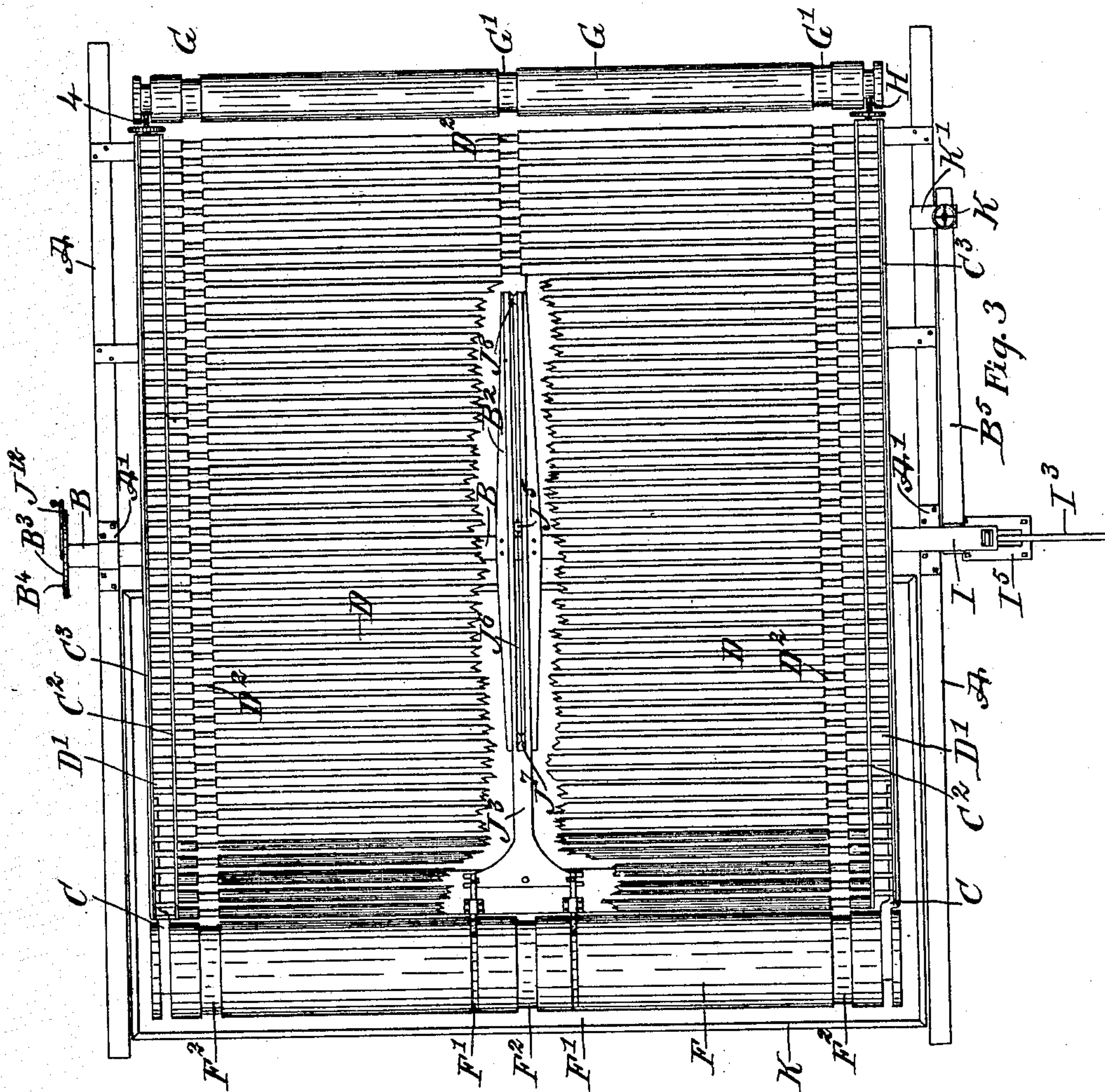


No. 860,500.

PATENTED JULY 16, 1907.

J. C. TATMAN.
ORE CONCENTRATOR.
APPLICATION FILED MAR. 2, 1906.

4 SHEETS—SHEET 2.



WITNESSES:

A. H. Davis
Wm. G. Woodard

INVENTOR.

John Cosgrove Tatman

BY

Munn & Co.

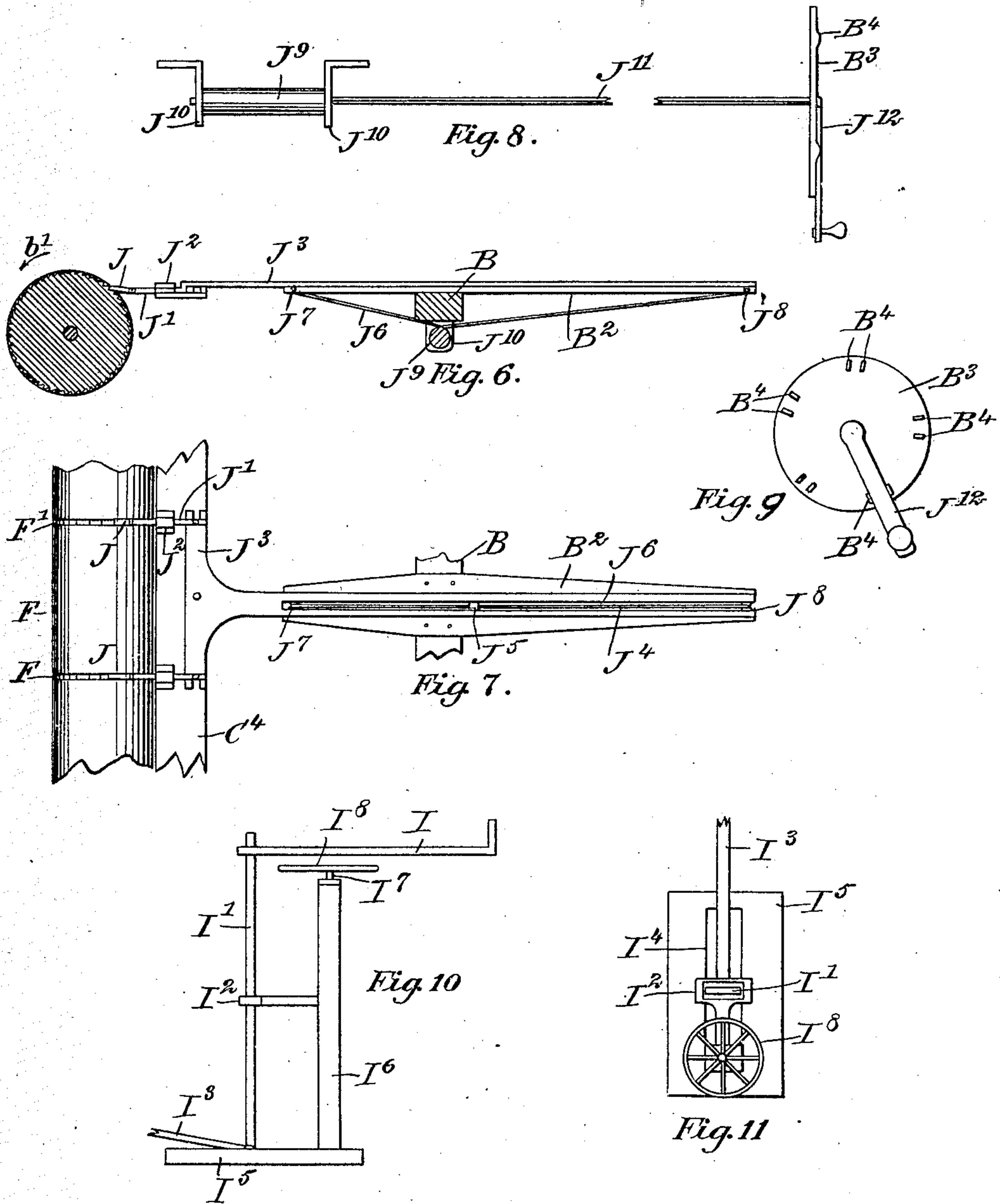
ATTORNEYS

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UNITED STATES PATENT OFFICE.

JOHN COSGROVE TATMAN, OF DENVER, COLORADO.

ORE-CONCENTRATOR.

No. 860,500.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed March 2, 1906. Serial No. 303,825.

To all whom it may concern:

Be it known that I, JOHN COSGROVE TATMAN, a citizen of the United States, and a resident of Denver, in the county of Denver and State of Colorado, have invented a new and Improved Ore-Concentrator, of which the following is a full, clear, and exact description.

The invention relates to ore concentrators using a riffled moving endless apron, and its object is to provide a new and improved ore concentrator arranged to insure a quick and thorough separation of the valuable metallic particles from the tailings in a very simple and exceedingly economic manner.

The invention consists of novel features and parts and combinations of the same which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the improvement; Fig. 2 is a transverse section of the apron and its roller table; Fig. 3 is a plan view of the improvement, the apron being removed and parts of the roller table being broken out; Fig. 4 is an enlarged transverse section of the improvement; Fig. 5 is an enlarged longitudinal sectional elevation of the same; Fig. 6 is a longitudinal sectional elevation of the mechanism for imparting an intermittent traveling motion to the apron; Fig. 7 is a plan view of the same; Fig. 8 is a side elevation of part of the same; Fig. 9 is an end view of the same; Fig. 10 is a side elevation of the mechanism for imparting a transverse reciprocating motion to the apron table and the apron; and Fig. 11 is a plan view of the same.

A suitably constructed framework A is provided with bearings A', in which are mounted to turn the trunnions B' of a rock shaft B, preferably square in cross section and extending transversely, as plainly illustrated in the drawings. This rock shaft B is engaged by bearings C' attached to an apron frame C, in which are journaled horizontally-disposed transverse main rollers D and side rollers D' inclined upwardly and outwardly from the ends of the main rollers D, as will be readily understood by reference to the drawings. For the purpose mentioned, the main rollers D are journaled in suitable bearings arranged on longitudinal bars C² forming part of the apron frame C, and the side rollers D' are journaled in suitable bearings arranged in the said bars C² and similar bars C³, likewise forming part of the frame C (see Fig. 2). Over the rollers D and D' extends the upper run of an endless apron E made of suitable flexible material and provided with transversely-extending riffles E', corrugations, grooves or the like. The said upper run of the apron, on account

of resting on the horizontal as well as the inclined rollers D, D', assumes a trough-like shape, to prevent spilling of the material over the sides of the apron.

The apron E passes around drums F and G, of which the drum F is somewhat larger in diameter than the drum G and is journaled in suitable bearings in the head end of the apron frame C, while the drum G is journaled in bearings H held lengthwise adjustable on the apron frame C, to allow of moving the drum G inward or outward, to render the apron E sufficiently taut for proper working of the same. The under side of the apron E is provided with lengthwise-extending ribs or bands E² engaging corresponding annular recesses D² in the rollers D, as well as similar annular recesses F² in the drum F, to hold the apron against accidental transverse movement on the rollers D' and drums F and G.

In order to impart a transverse reciprocating motion to the frame C, the rollers D and D', drums F and G, and apron E, the following device is provided: To one side of the frame C is secured a transversely-extending arm I, engaged at its outer end by the upper end of a lever I' fulcrumed on a bracket I² and engaged at its lower end by a pitman I³ connected with suitable machinery for imparting a swinging motion to the lever I', which, by the arm I, imparts a transverse sliding motion to the frame C and the parts carried thereby. The pitman I³ is guided in a suitable guideway I⁴ arranged on a base I⁵ carrying a standard I⁶ in which is journaled a screw-rod I⁷ screwing in the bracket I² and provided with a hand wheel I⁸, which, when turned, causes the bracket I² to move up or down, according to the direction in which the hand wheel I⁸ is turned. By this arrangement the fulcrum for the lever I', that is, the bracket I², is shifted so that more or less throw is given to the frame C and the parts carried thereby without changing the throw of the pitman I³.

In order to impart an intermittent traveling motion to the apron E in the direction of the arrow a' independently of any movement of the main frame, the following device is provided: On the drum F are formed ratchet wheels F' engaged by pawls J, pivoted to rods J' mounted to slide lengthwise in suitable bearings J² attached to the forward cross arm C⁴ of the apron frame C (see Figs. 6 and 7), and the said rods J' are attached to a slide J³ mounted to slide in longitudinal bearings B² attached to the shaft B at or near the middle thereof, as plainly indicated in Figs. 3 and 7. The slide J³ is provided with a lengthwise-extending slot J⁴ and a transverse pin J⁵, to which are secured, on opposite sides, the ends of a rope J⁶ passing over pulleys J⁷ and J⁸ journaled on the slide J³ on opposite sides of the pin J⁵. The rope J⁶ winds

several times around a drum J⁹ journaled in suitable bearings J¹⁰ attached to the under side of the shaft B, and the shaft J¹¹ of this drum J⁹ is provided with a crank arm J¹² under the control of the operator for
 5 imparting a rocking motion to the drum J⁹, so as to cause the rope J⁶ to impart a forward and backward sliding motion to the slide J³, which, by the rods J' and the pawls J engaging the ratchet wheels F', intermittently turns the drum F in the direction of the
 10 arrow b' independently of any movement of the main frame, thus causing the apron E to travel intermittently in the direction of the arrow a'.

The crank arm J¹² normally extends between sets of spaced pins B⁴ held on a disk B³ eccentrically secured to one end of the shaft B, the rocking motion of which is limited by an arm B⁵ attached to the shaft B and extending between two brackets K and K' held on the framework A (see Fig. 1). The swinging motion of this arm B⁵ is limited by a screw-rod K² screwing in the bracket K² and abutting against the arm B⁵.
 15 By turning the screw-rod K² a swinging motion can be given to the arm B⁵, so as to turn the shaft B to tilt or incline the frame C, and consequently the apron E, to a desired degree; that is, to raise the forward end
 25 of the apron E for the upper run of the latter to travel forwardly and upwardly. The apron E, when passing around the drum F, passes into water or other liquid contained in a tank L, so that any concentrates contained in the riffles are washed out of the same during
 30 the rearward travel of the lower run of the apron, it being understood that the tank L is sufficiently long for the riffles to pass a considerable distance through the water, to insure a complete washing out of any concentrates contained in the riffles. By reference to
 35 Fig. 5 it will be seen that the apron has free, unobstructed travel through the liquid contained in the tank L.

The operation is as follows: By the operator manipulating the crank arm J¹² an intermittent forward
 40 feeding of the apron E in the direction of the arrow a' is obtained, and at the same time a transverse shaking motion is given to the apron E by imparting a reciprocating sliding motion to the frame C by the arm I and connected parts, as above explained. Across the head
 45 of the apron E, at or near the drum F, is arranged a perforated pipe for discharging jets of water onto the upper face of the upper run of the apron, so as to wash the tailings backward in the inverse direction of the arrow a', to finally discharge the tailings at the rear
 50 end of the apron, at the drum G. As the upper run of the apron E assumes a trough-like shape, it is evident that the wash water does not wash valuable particles over the sides of the apron, and consequently the valuable metallic particles readily lodge in the riffles
 55 and are continually carried forward bodily with the belt, to be finally discharged into the tank L, as previously explained.

From the foregoing it will be seen that the material discharged onto the apron E, at or near the rear end
 60 thereof, and carried bodily forward with the apron is acted on by the wash water, which tends to separate the tailings from the heavy particles, which latter

lodge in the riffles, while the tailings are washed rearwardly over the rear end of the apron. Thus it will be seen that the valuable particles lodging in the
 65 riffles are carried bodily forward with the apron, and the tailings are completely washed out of the concentrates, but no concentrates are lost, as the riffles extending throughout the length of the apron and in a transverse direction, thereby prevent the valuable
 70 particles from being washed off the apron with the tailings. Thus the separation of the valuable particles from the tailings takes place in a very simple and exceedingly economical manner and without the aid of skilled labor.

By means of the construction herein shown and described, moreover, the apron is subjected to a movement which is singularly efficient in separating the heavier valuable metallic particles from the tailings. This movement is the result of the joint coöperation
 80 of the intermittent progressive movement of the apron simultaneously with the transverse bodily movement thereof.

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

1. An ore concentrator comprising a rock shaft, a main frame mounted upon said shaft and adapted to slide thereon transversely of said frame, transverse drums journaled in the ends of said frame, an endless apron having transverse riffles mounted on said frame, a ratchet wheel secured to one of said drums, a reciprocating slide provided with a pawl adapted to engage said ratchet wheel, and means for imparting a sliding motion to said frame on said rock shaft, substantially as shown and described.

2. An ore concentrator provided with a roller table having a main frame, transverse rollers journaled in the frame and arranged in a horizontal plane, side rollers journaled in the frame at the ends of the main rollers and inclined thereto to form a trough-like structure, drums journaled on the ends of said frame, an endless apron mounted to travel over said rollers and assuming a trough-like shape, a transverse shaft on which the middle of said frame is mounted to slide, reciprocating means for imparting transverse sliding motion to said frame on said shaft, means for adjusting the frame vertically, and means for
 105 intermittently turning one of said drums to permit an intermittent traveling motion to said apron independently of the movement of the main frame, substantially as shown and described.

3. An ore concentrator provided with a roller table comprising a frame, transverse main rollers journaled in the frame and arranged in a horizontal plane, side rollers journaled in the frame at the ends of the main rollers and inclined thereto to form a trough-like structure, drums journaled in the ends of said frame, an endless apron mounted to travel over said drums, means for intermittently turning one of the drums to impart a traveling motion to said apron independently of any movement of said frame, a rock shaft mounted transversely to the direction of travel of the said apron and in which the frame is mounted to slide transversely, means for imparting transverse motion to said frame on said shaft, and means connected with said shaft to rock the latter thereby to tilt the frame and apron to the desired inclination, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN COSGROVE TATMAN.

Witnesses:

H. J. INGERSOLL,
 FRED S. SWEET.