

(No Model.)

J. TULLOCH.
ORE CONCENTRATOR.

No. 412,434.

Patented Oct. 8, 1889.

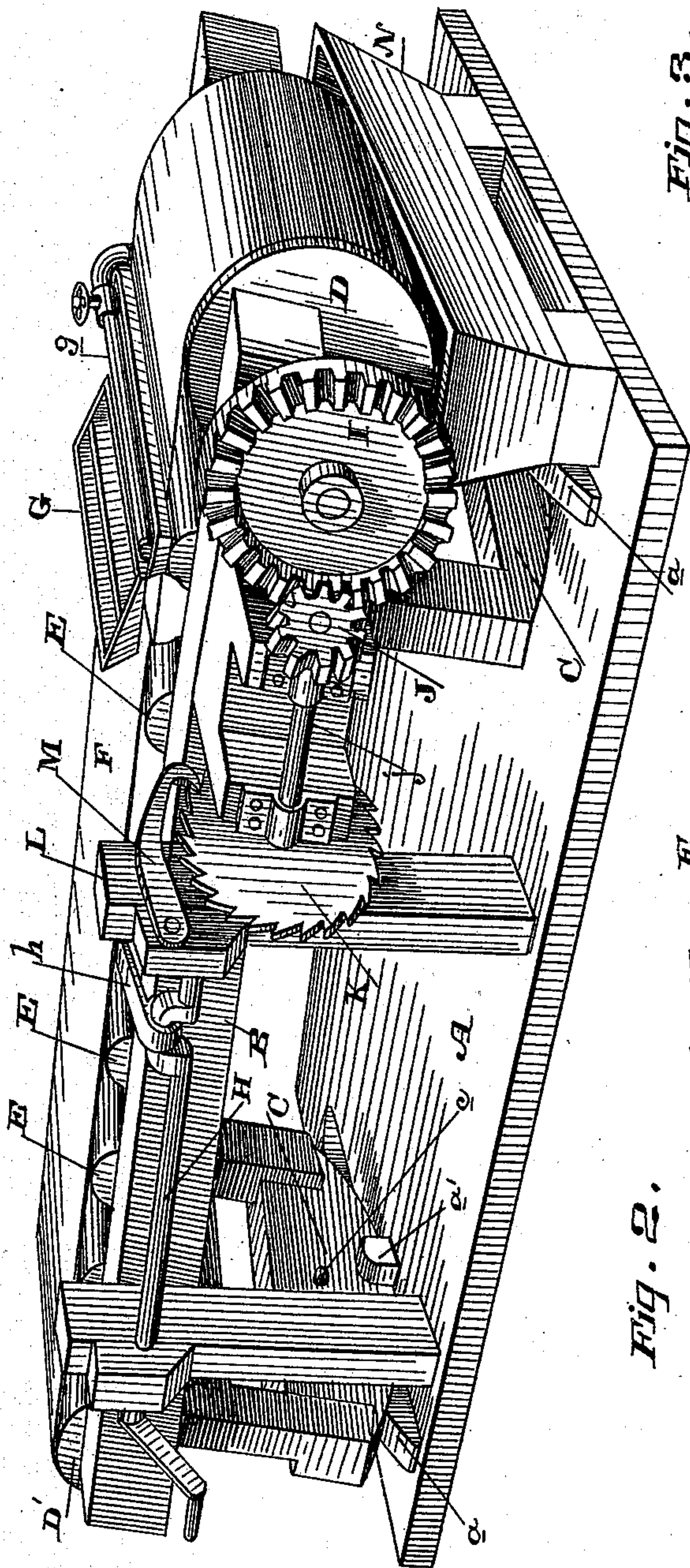


Fig. 3.

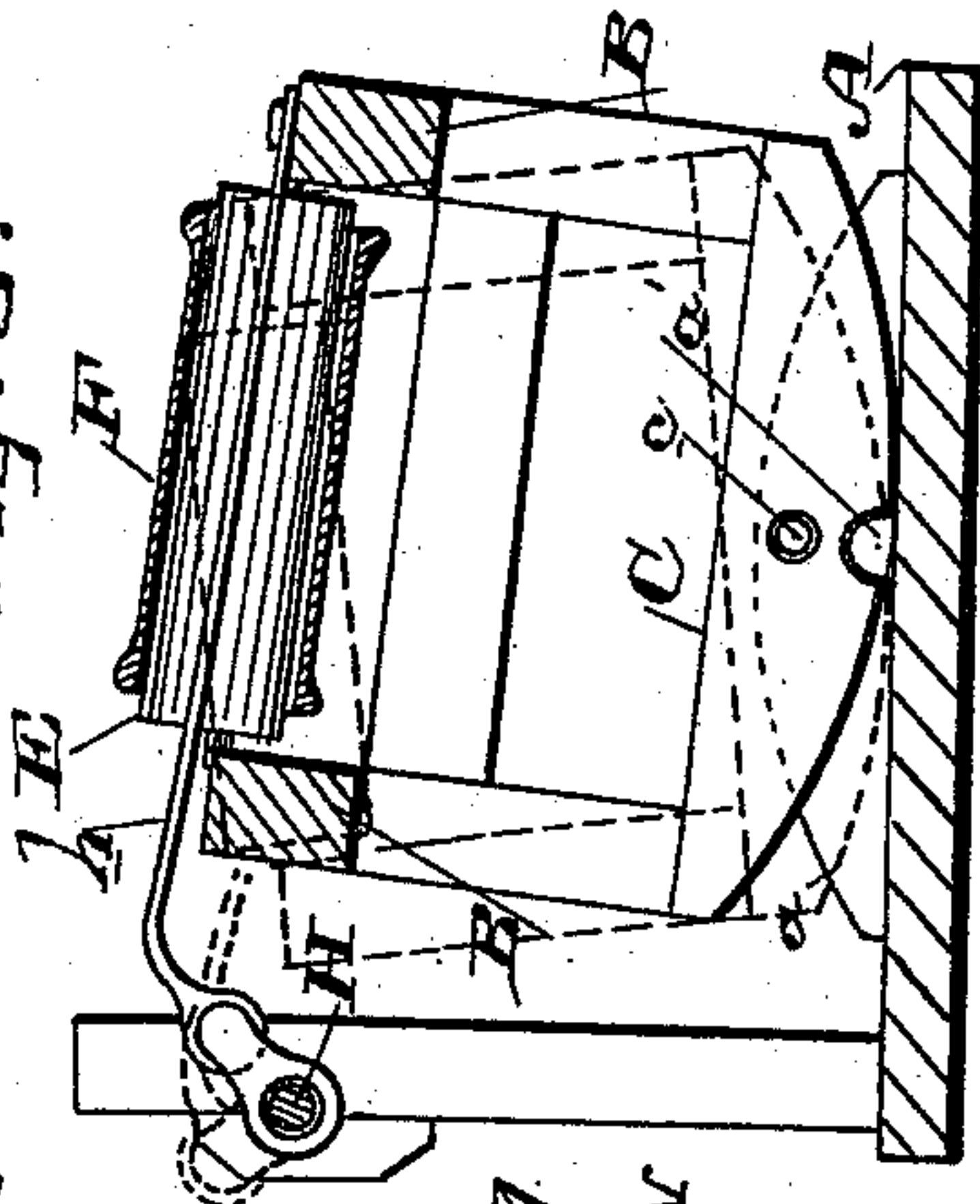
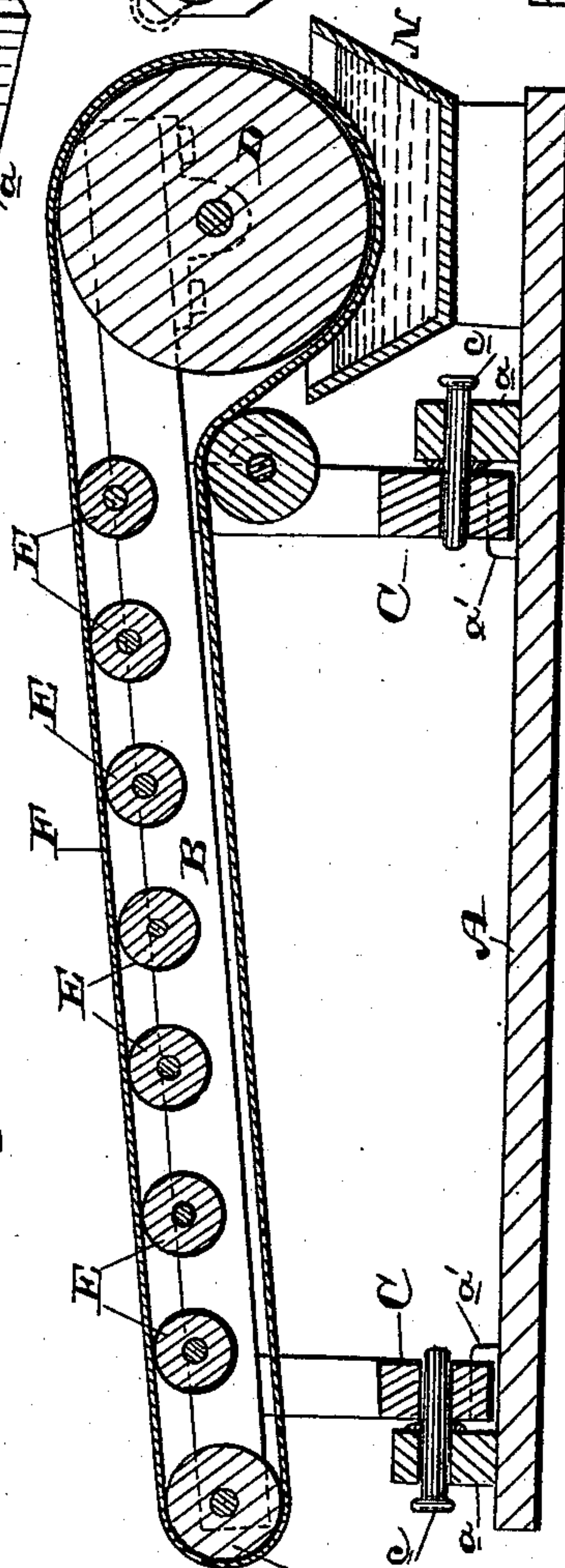


Fig. 2.



Witnesses,
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UNITED STATES PATENT OFFICE.

JAMES TULLOCH, OF ANGEL'S CAMP, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 412,434, dated October 8, 1889.

Application filed July 24, 1888. Serial No. 280,928. (No model.)

To all whom it may concern:

Be it known that I, JAMES TULLOCH, of Angel's Camp, Calaveras county, State of California, have invented an Improvement in Ore-Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of ore-concentrators in which an inclined endless traveling belt is employed, and upon which the ore, together with a stream of water, is fed, whereby the lighter and waste portions are washed down the incline, while the sulphurets and heavier precious particles clinging to the surface of the belt are carried upwardly against the stream of water and are washed off below; and my invention consists in the constructions and combinations of devices, which I shall hereinafter fully describe and claim.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my concentrator. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a vertical cross-section of same.

A is the bed-frame, and B is the belt-frame, said last-named frame being provided with rockers C, which rest upon the bed-frame, and are held in position by any suitable means, as by the pins *c* passing into the rockers from cleats *a* and the fixed guide-bearings *a'* in the bed-frame, upon which the base of the rockers are grooved.

The frame B is set at a slight inclination, and carries at its upper end a driving-drum D and at its lower end a guiding-drum D', and also intervening supporting-rollers E.

F is the endless belt passing over the two drums, its upper fold being supported on the carrying-rollers.

G is the ore-feeder, and *g* is the water-spreader, whereby the ore and water are deposited on the surface of the belt in the usual manner.

The frame B has imparted to it a laterally-rocking motion by means of a rotary crank-shaft H and connecting rod or link *h*. The belt has an intermittent or periodical travel imparted to it by the following mechanism: Upon the end of the drive-drum D is a gear I, with which a pinion J on a counter-shaft *j*

engages, the other end of said counter-shaft having a ratchet K. Pivoted to a fixed standard L is the gravity-pawl M, which engages the ratchet. The teeth of the ratchet are so constructed that as the rocking frame B moves over away from the pawl the ratchet being carried with the frame comes in contact with and is engaged by said pawl, whereby it is turned one tooth, which movement of the ratchet, through the gears described, partially rotates the driving-drum and effects the movement of the belt, or, as it is ordinarily called, its "uphill travel." As the frame B rocks back again its ratchet moves away from the pawl, which slips over and engages the succeeding tooth, so that when the frame rocks again on its forward movement the belt is once more caused to travel, it having remained stationary during the backward movement as the pawl slipped the tooth of the ratchet. It will thus be seen that the rocking motion of the frame itself effects the periodical travel of the belt.

It is usual in this class of machines to have the tank in which the surface of the belt is washed under the belt about at its center. Instead of this I have located the washing-tank N at the head of the machine, directly under the driving-drum and high enough up to let the lower portion of said drum pass into the water in the tank, so that the drum itself actually rocks within the water, which washes off the sulphurets from the surface of the belt passing through it.

The general operation of the machine is as follows: The lighter and worthless stuff is carried down the incline by the downflowing stream of water, while the heavier particles are concentrated, and, settling in said stream, are deposited upon the surface of the belt by means of the rocking motion which the belt receives from the lateral motion of the frame on which it is mounted, and these particles, clinging to the surface of the belt against the downflowing stream of water, are carried up by the periodical travel of the belt over the head of the machine, and are washed off from its surface by the rocking of the driving-drum D in the tank of water. This periodical movement of the belt, instead of a continuous travel, as is usually the case, is very effective in giving the precious particles and

sulphurets a chance to settle under the action of the rocking movement. The whole mechanism for imparting these movements is of a simple and effective character, and is
5 very durable and economical.

I am aware of endless-belt concentrators in which the belt-supporting frame has imparted to it what is known as a "side shake;" but it will readily be seen that, as said frame is
10 supported on spring-standards at each side, a side movement does not alter the level of the belt-surface, but simply carries it bodily from side to side, keeping its surface laterally horizontal, and it has not, therefore, a true
15 rocking motion, such as is produced by my rockers, for my belt changes the inclination of its surface at each movement.

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

1. In an ore-concentrator, a frame having rockers by which it is supported, and power mechanism connected with said frame for moving it on its rockers, in combination with
25 an endless belt mounted on the frame, the drums D D', the former having the gear I, a counter-shaft on the frame parallel with the travel of the belt, a pinion and ratchet-wheel on said counter-shaft, and a pawl engaging
30 the ratchet, whereby an intermittent or periodical travel is imparted to said belt, substantially as herein described.

2. In an ore-concentrator, a frame having rockers on which it rests, and a power mechanism connected with the frame for moving
35 it on its rockers, in combination with an endless belt mounted on the frame, a counter-shaft on the frame parallel with the belt-gearing between said belt and one of the
40 driving-drums, a ratchet on the counter-shaft,

and a stationary pawl adapted to engage and partially rotate the ratchet as it comes in contact with it by the rocking movement of the frame on which the belt is mounted, substantially as herein described.

3. In an ore-concentrator, a laterally-rocking frame and an endless belt mounted thereon, in combination with a driving-drum carried by the frame and over which the belt passes, a gear on the shaft of the driving-
50 drum, a pinion on a counter-shaft carried by the frame at one side of the belt and parallel with its travel and meshing with the said gear, and a ratchet on said counter-shaft, and a stationary pawl adapted to engage and partially turn said ratchet by the movement of
55 the rocking frame, whereby a periodical travel is imparted to the endless belt, substantially as herein described.

4. In an ore-concentrator, a frame having
60 rockers on which it rests and an endless belt mounted upon said frame, in combination with a crank-shaft and connecting-link for moving the frame on its rockers, a driving-
65 drum carried by the frame and over which the endless belt passes, a counter-shaft at one side of the belt and parallel with its travel, a ratchet carried by said counter-shaft for rotating said driving-drum, the pinion J and gear I, and a stationary pawl for engaging
70 and partially turning the ratchet by the movement of the rocking frame, whereby a periodical travel is imparted to the belt, substantially as herein described.

In witness whereof I have hereunto set my
hand.

JAMES TULLOCH.

Witnesses:

S. H. NOURSE,
J. H. BLOOD.