(Model.) 4 Sheets—Sheet 1

# W. F. CARTER & J. M. ADAMS.

## ORE CONCENTRATOR.

No. 285,110. Patented Sept. 18, 1883.

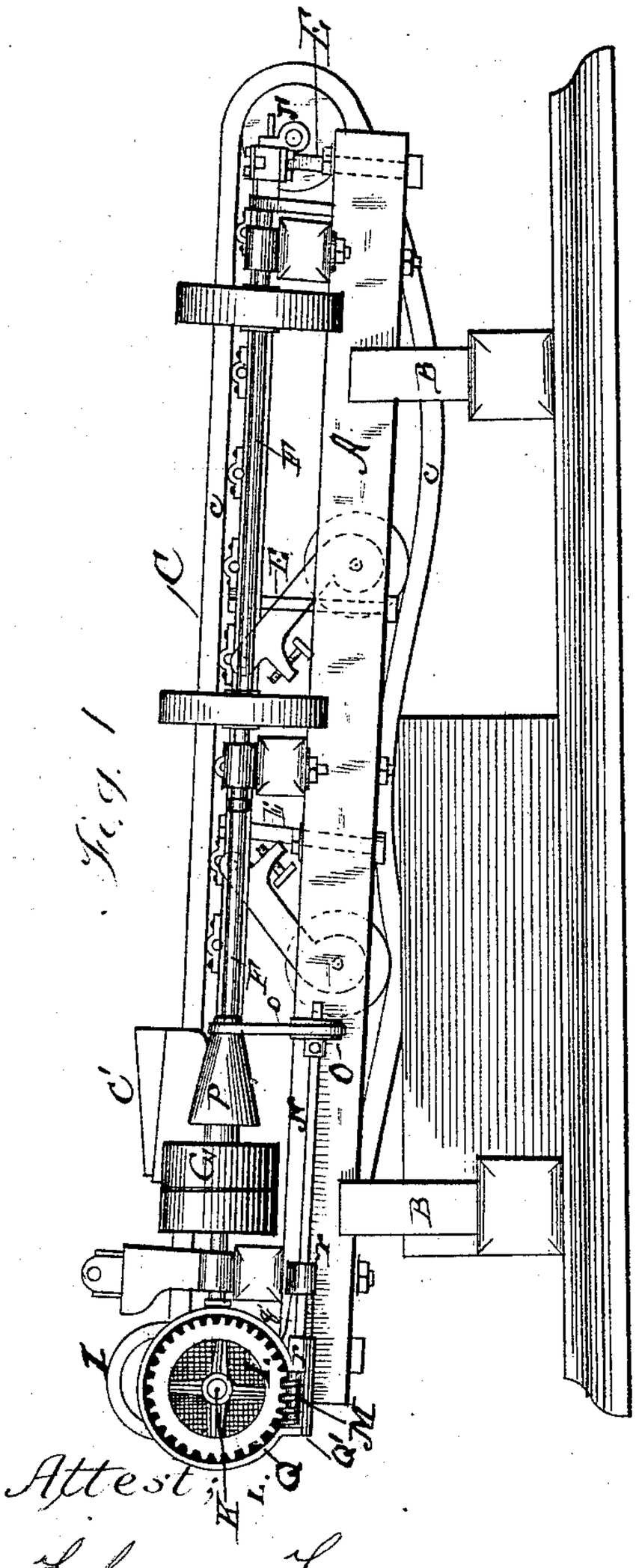

Fig. 1

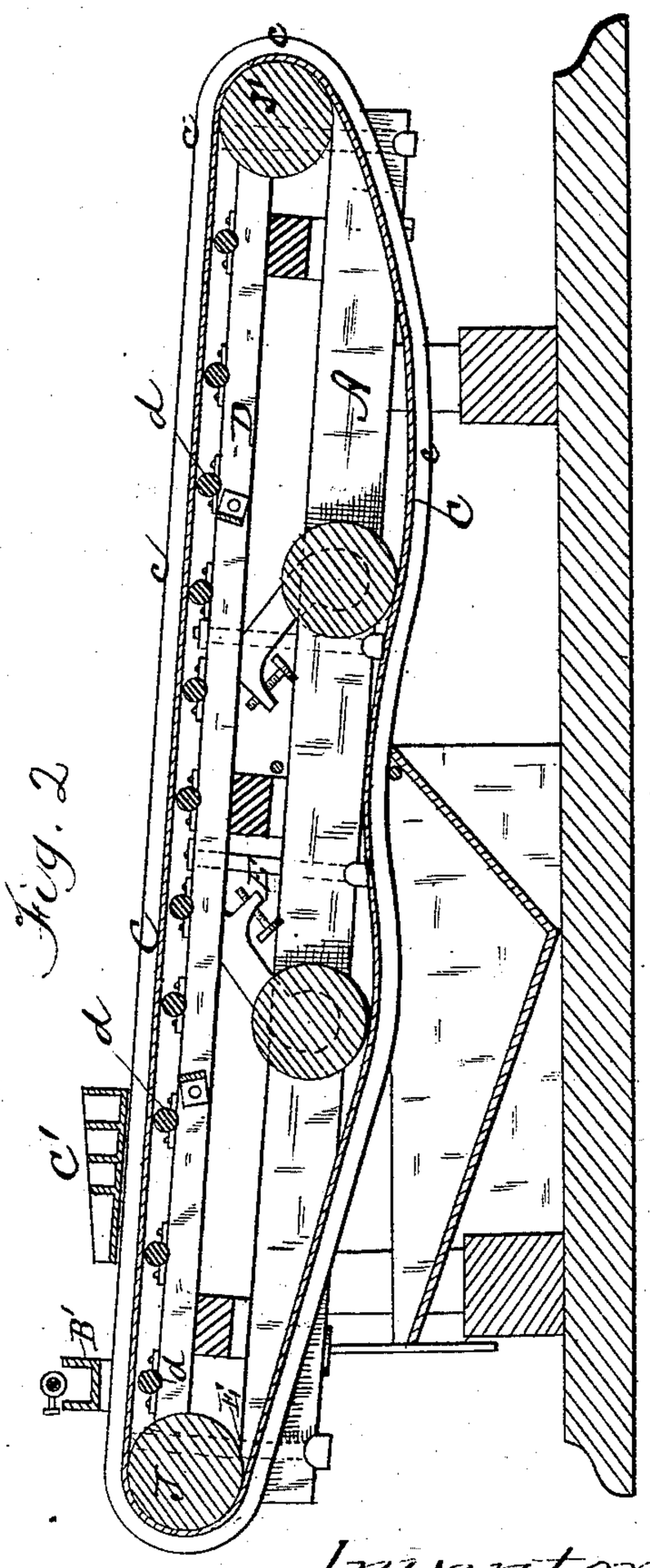

Fig. 2

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(Model.)

4 Sheets—Sheet 2.

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## ORE CONCENTRATOR.

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Fig 7

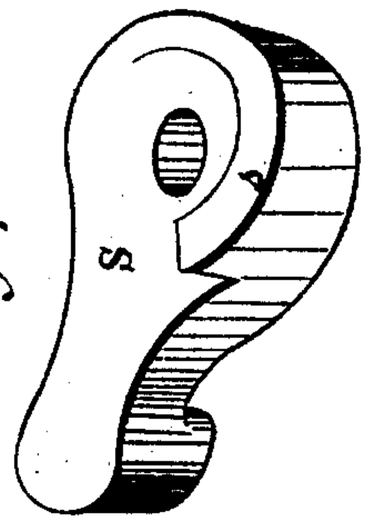



Fig 8

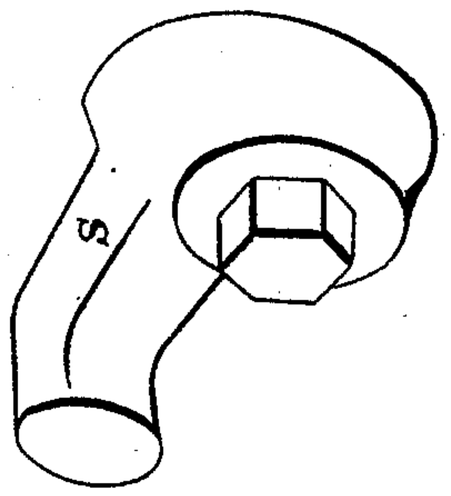
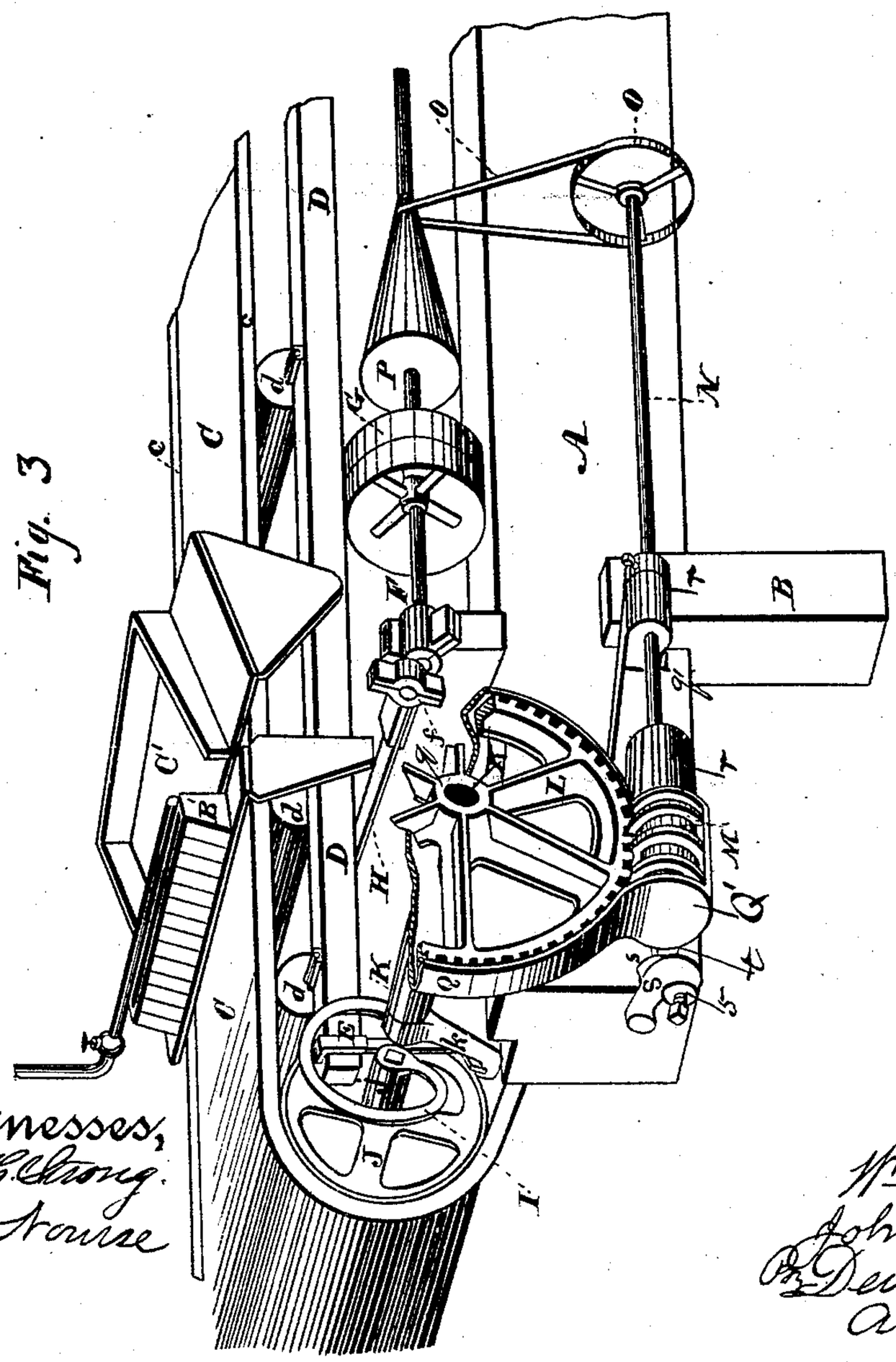



Fig. 3

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## ORE CONCENTRATOR.

No. 285,110. Patented Sept. 18, 1883.

Fig. 6.

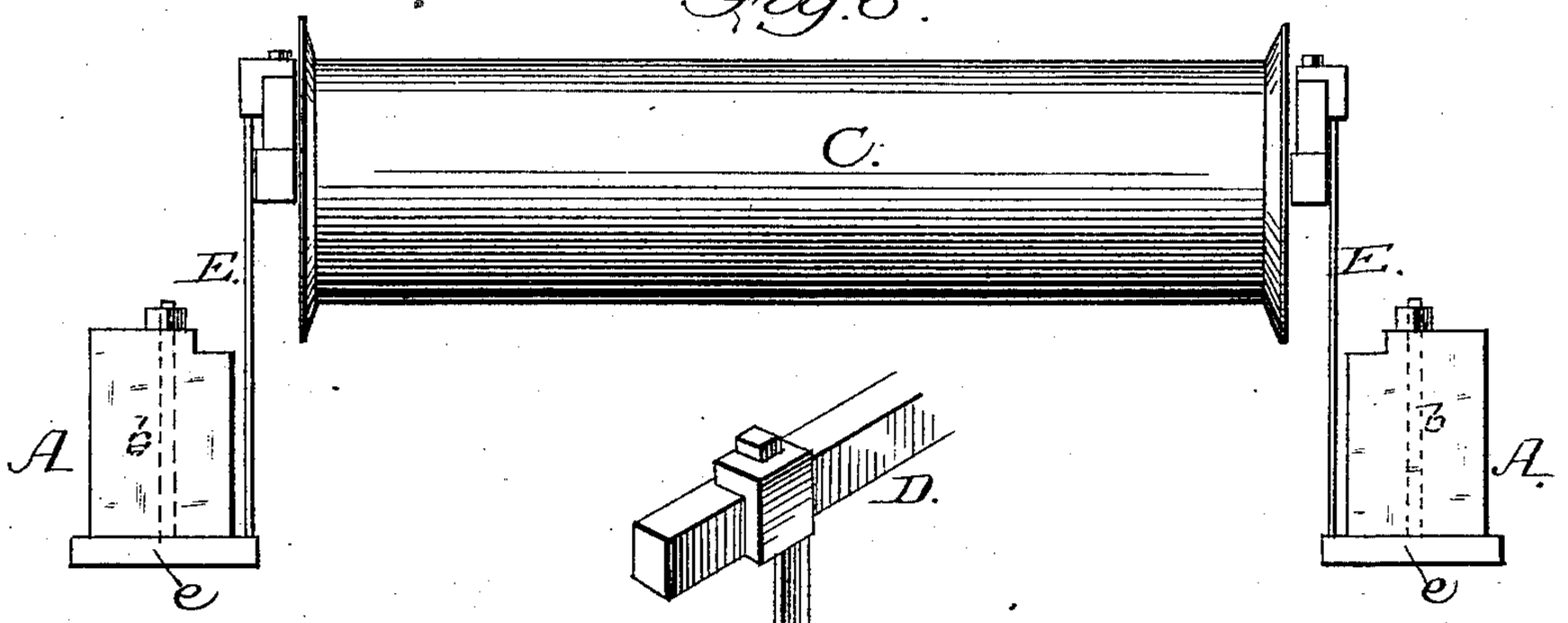



Fig. 4.

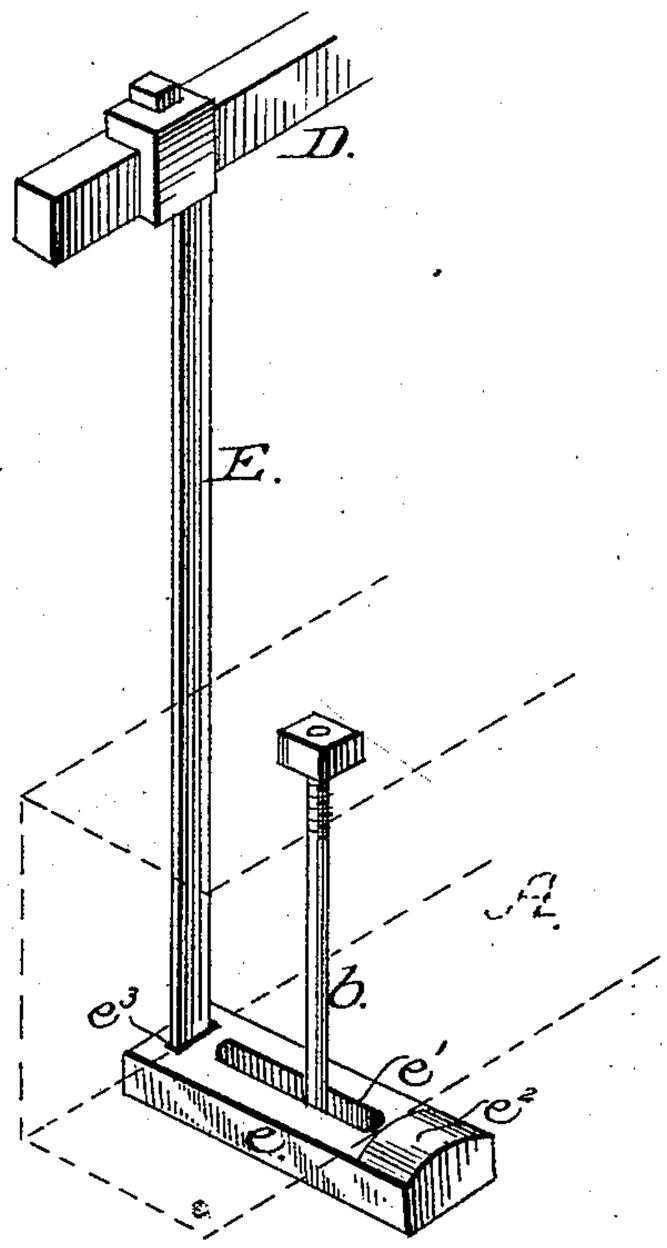
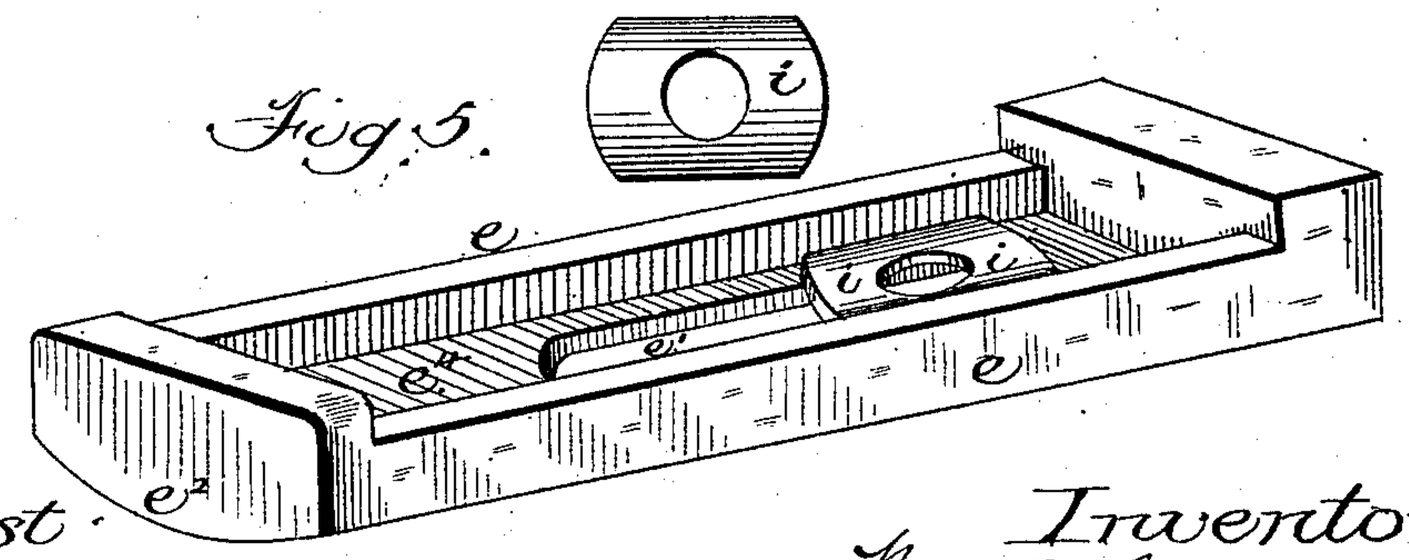



Fig. 5.

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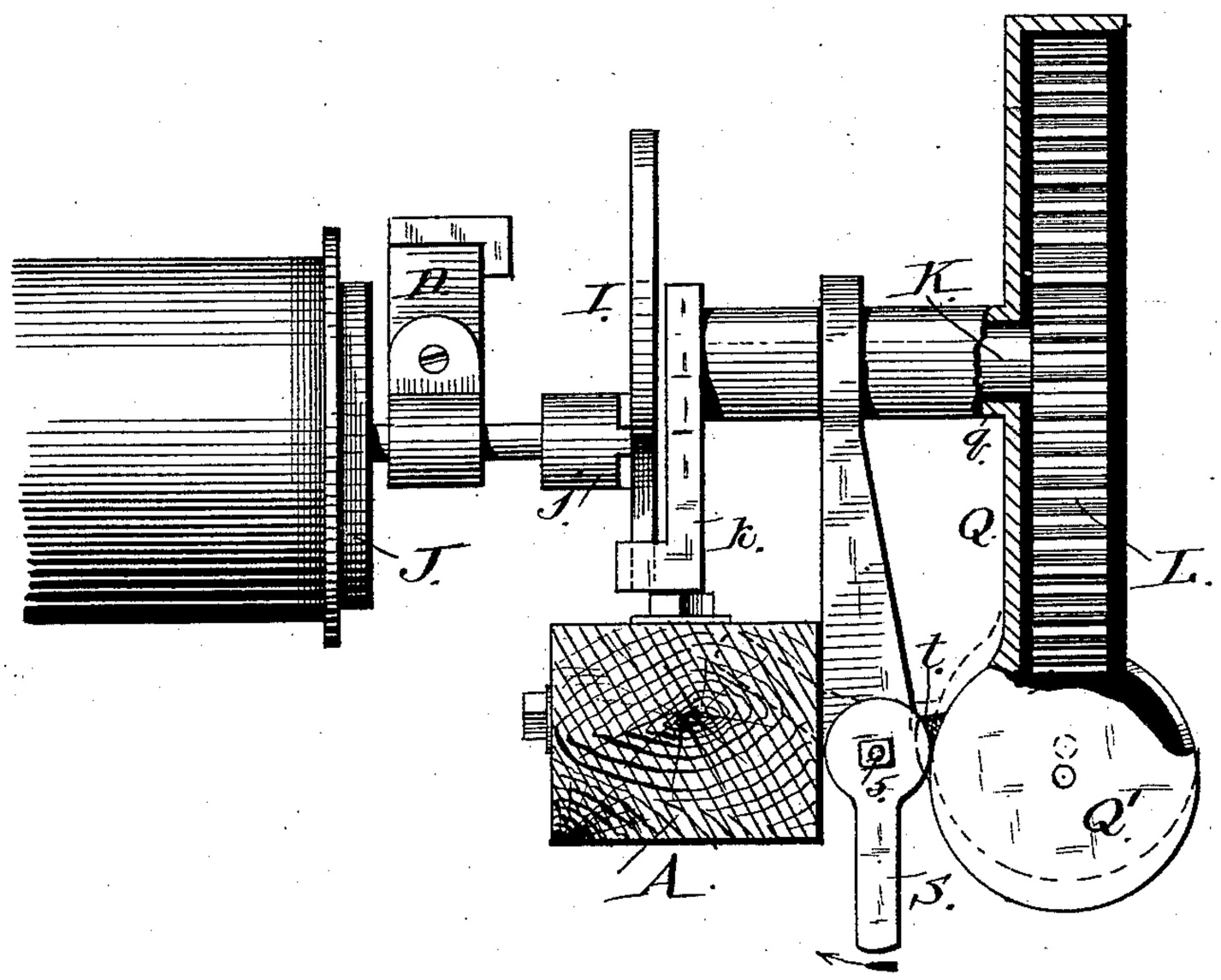
## ORE CONCENTRATOR.

No. 285,110. Patented Sept. 18, 1883.

*Fig. 9.*

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# UNITED STATES PATENT OFFICE.

WILLIAM F. CARTER AND JOHN M. ADAMS, OF SAN FRANCISCO, CAL.

## ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 285,110, dated September 18, 1883.

Application filed May 2, 1882. (Model.)

*To all whom it may concern:*

Be it known that we, WILLIAM F. CARTER and JOHN M. ADAMS, of the city and county of San Francisco, State of California, have invented Improvements in Ore-Concentrators; and we hereby declare the following to be a full, exact, and complete description thereof.

Our invention relates to certain improvements in ore-concentrators of that class in which an endless belt or blanket receives the ore and is made to revolve against a stream of water, whereby the lighter particles are carried off, while the heavier ones are carried upward by the belt and are deposited in a tank below.

Our invention consists of certain details of construction and combination of devices, as will be hereinafter fully described and specifically claimed.

For a more particular explanation of our improvements, reference is hereby made to the following description, and to the accompanying drawings, in which—

Figure 1 is a side elevation of our improved concentrator. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is an enlarged view of the principal operating devices. Fig. 4 is an enlarged detail, illustrating the yielding supports which sustain the apron-frame, and the fastenings of said supports. Fig. 5 is an enlarged view of the under side of the lower support of the yielding supports. Fig. 6 is a front elevation of one of the apron-drums. Figs. 7 and 8 are views of the cam to stop the feed of the apron. Fig. 9 is a detail showing the stop mechanism enlarged.

A represents the main side timbers of the machine, supported upon legs B.

C represents the endless belt or blanket, having the side flanges, *c*. This belt travels over a frame, a side piece of which is shown by D, in which are journaled rollers *d d*, upon which the belt passes.

J is a large roller or drum at the upper end or head of the machine, over which and by means of which the belt travels. The other end of the machine has a similar drum, J′, around which the belt passes at the lower end.

B′ represents the water-distributer, and C′ the ore-distributer, from which the ore is delivered upon the belt.

A short description of the general nature of concentrators of this class will assist in understanding the invention. In machines of this class an endless belt or blanket travels upward over suitable rollers or supports and around end drums, from the revolution of one of which it derives its motion. This is commonly called the "uphill" travel, and is designed to carry the ore deposited upon the belt's surface upward against a downflowing stream of water, the action of which is to carry downward the light worthless material, while the heavy valuable material resists the flow and is carried up and around the drum and is washed off in a tank below. This single motion being found by experience to be insufficient for a thorough concentration and separation, a secondary motion is given to the belt, either in the direction of its length or its width, known, respectively, as an "end" and a "side" shake. This shake, of whatever description, serves to agitate the ore, and thus to allow the heavier and precious material to settle upon the belt. The machine here shown is one in which the belt has imparted to it a side shake, as will now be explained. The frame D is supported by elastic or spring straps E, adapted to yield sufficiently to allow the frame to swing. The lower ends of these straps E pass down inside of the main side timbers, A, and are supported by them through the medium of blocks *e*, in a manner hereinafter explained.

F is a shaft carrying the driving-pulley G. The end of shaft F is provided with a short crank, *f*, to which is connected a pitman, H, extending to and secured to frame D. Power applied to pulley G causes the pitman H to move the frame D, with its belt C, forward and backward, swinging upon supporting-straps E, thus giving to said belt the side shake.

In order to obtain the uphill travel of the belt and make provision for its side shake, as just explained, we have the following: The drum J has a gudgeon, *j*. To this gudgeon is rigidly secured a strong spring, I, having a spiral shape, as shown, and adapted to yield

laterally. Journaled in the frame is a shaft, K, carrying upon one end a larger gear-wheel, L. To the other end of this shaft is secured a crank, *k*, the end of which engages the free end of spiral spring I. The gear-wheel L meshes with a worm-gear, M, below. This worm-gear is upon one end of a shaft, N, the other end of which carries a pulley, O, from which a belt, *o*, extends to a cone-pulley, P, upon the shaft F, above described. When power is applied to shaft F, it is transmitted, as before described, to cause the side shake of the belt, and at the same time, through pulleys P and O, shaft N, and worm M, it is transmitted to gear L and shaft K. This shaft, revolving, causes its crank *k* to revolve the drum J by means of the spiral spring I, which, though rigid for this pressure, yields laterally and allows the drum J to move sidewise with the frame D and the belt.

It is sometimes desirable to stop the uphill travel of the belt immediately. To do this we provide a circular casing or rim, Q, the hub *q* of which fits loosely, as a sleeve, upon shaft K or upon its bearing. This casing surrounds the gear L, except at the bottom, where it extends downwardly and forms a casing, as shown at Q′, for the worm-gear M, and has a projection, *q*′, supporting boxes *r r* for bearings for shaft N.

Under certain circumstances it is highly desirable to instantly stop the movement of the belt C, and in order to accomplish this the pulley O must be suddenly relieved from the effects of the driving-belt *o*, which we accomplish as follows: The pulley O, shaft N, boxes *r r*, worm-gear M, and casing Q Q′ being all supported from one point—namely, the hub *q* of the casing surrounding shaft K—they have a common rotary movement around said shaft, the preponderance of the weight, obviously, on the side toward the pulley O on shaft N tending to depress pulley O and keep the belt *o* stretched, so as to rotate pulley O. By moving all the elements just previously recited so as to elevate the large pulley O the effect of the belt *o* ceases. From the rear of the portion Q′ of the casing projects a stud, *t*, and moving on a spindle, 5, conveniently located on the machine, is a cam, S, rotating in a plane at right angles to the shaft N, and provided with the face *s*, adapted to come in contact with the stud *t* and force it in the direction of the pulley O. This movement rotates the casing Q Q′ to a limited degree around shaft K, and thereby raises worm-gear M, boxes *r r*, shaft N, and pulley O, the pulley moving through the longest arc and being relieved from the effect of belt *o*.

It has been found by experience that, despite the greatest care and uniformity in making the class of machines, results will differ in machines of the same construction. In some the ore will bank or collect at one side of the belt against the flange, and in others it will bank in another place without any apparent cause, as the belts all run smoothly and easily, and are, to all appearances, nicely adjusted.

We have discovered that by changing to a limited degree the inclination of the supporting-strips E the belt is affected in such manner as to remedy this fault and to distribute the ore evenly over its surface. We accomplish this adjustment by means of a rocking nut, which enables the operator to change the position of the faces of the supports of straps E. The said supports are constructed as follows: Bolts *b*, passing vertically through the timbers A, hold beneath said timbers blocks *e*, having their upper surfaces where they bear against the timbers rounded, as shown at $e^2$, and having longitudinal slots *e*′ to receive the bolts, and sockets $e^3$ to receive the lower ends of the straps E. The lower surface of each block has a longitudinal depression, $e^4$, in which rests a washer, *i*, having a curvilinear face, against which rests the head of the bolt when in position. A blow or a series of blows upon the block *e* will cause it to change position by rocking on the curved face $e^2$ against the timber A, and the curved face of washer *i* against the head of the bolt, so as to vary the position of strap E as to a vertical line.

We do not confine ourselves to this particular construction or means for adjusting these strips, as there are many ways in which it can be accomplished. We consider, however, the way here shown as being a good one, as it secures the strips firmly, and yet allows their adjustment when necessary.

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

1. In an ore-concentrator, an endless belt or blanket, a swinging frame, and means for imparting a shake to said frame, in combination with the means for causing said belt to travel forward, consisting of the drum J, having gudgeon *j*, spiral connecting-spring I, shaft K, crank *k*, and gearing connecting said shaft K with the driving-power, substantially as herein described.

2. In an ore-concentrator, an endless belt or blanket, a swinging frame, and the means for imparting a shake to said frame, consisting of the driving-pulley G, shaft F, crank *f*, and the pitman H, in combination with the means for causing said belt to travel forward, consisting of the cone-pulley P, driving-shaft F, belt *o*, pulley O, shaft N, worm-gear M, gear-wheel L, shaft K, crank *k*, connecting spiral spring I, gudgeon *j*, and drum J, substantially as herein described.

3. In an ore-concentrator, the endless belt or blanket C, in combination with the drums J J′, shaft K, suitably connected with said driving-drum J, gear-wheel L, worm-gear M, loosely-journaled swinging casing Q Q′, cam S,

shaft N, pulley O, belt *o*, cone-pulley P, and main driving-shaft F, substantially as and for the purpose specified.

4. In an ore-concentrator, an endless traveling belt or blanket, a supporting-frame, and suitable mechanism for imparting a shake thereto, in combination with the supporting-straps E and the means for adjusting their inclination, consisting of the pieces *e*, having curved projections $e^2$ and slots *e'*, the securing-bolts *b*, and curved washers *i*, substantially as described.

In witness whereof we hereunto set our hands.

WILLIAM F. CARTER.
JOHN M. ADAMS.

Witnesses:
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G. W. EMERSON.