(No Model.)

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

ORE CONCENTRATOR.

No. 272,509. Patented Feb. 20, 1883.

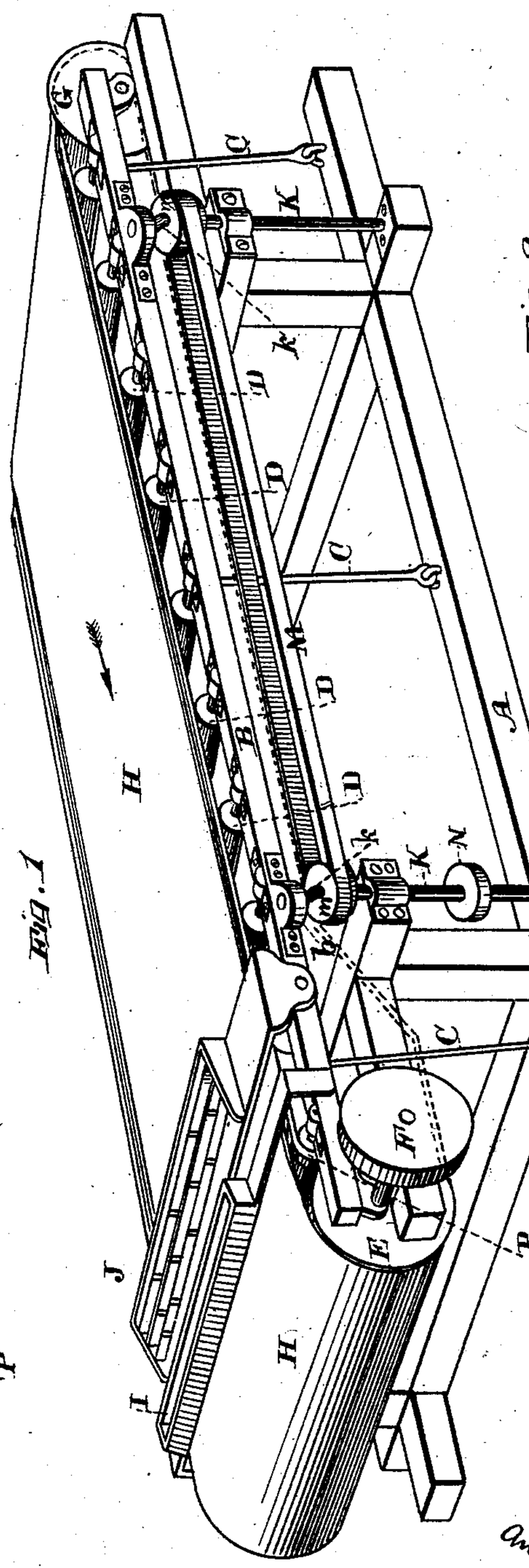

Fig. 1.

Fig. 3.

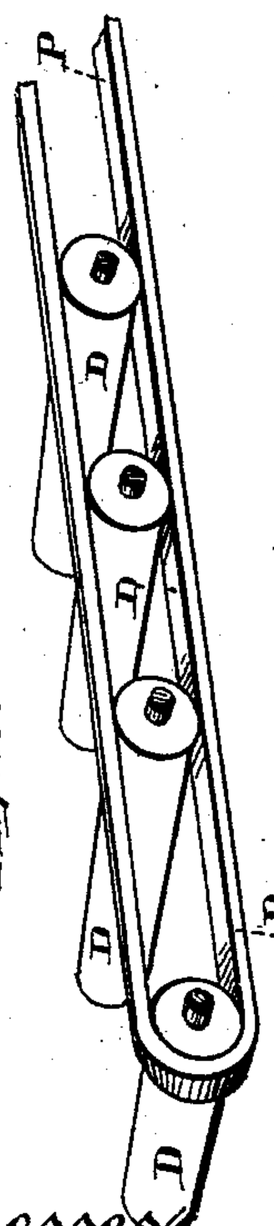

Fig. 2.

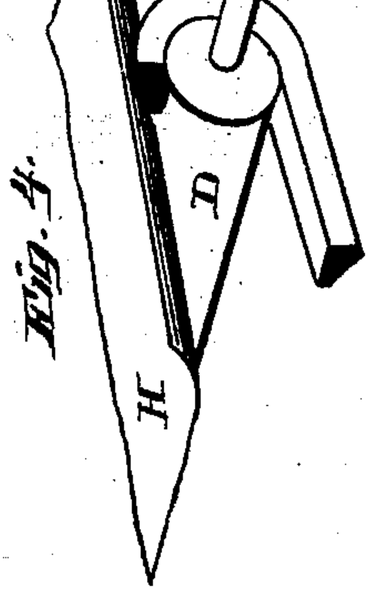

Fig. 4.

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

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 272,509, dated February 20, 1883.

Application filed September 25, 1882. (No model.)

To all whom it may concern:

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

Our invention relates to certain new and useful improvements in that class of ore-concentrators in which an endless traveling belt is mounted upon a shaking frame.

Our invention consists of the several combinations of devices hereinafter explained and claimed.

A more particular description of these improvements is hereinafter given.

The object of our invention in respect to the first improvement is to more effectively agitate and concentrate the ore by imparting to an endless-belt concentrator a shake or motion which will be found effective, and which is in effect a combination of the end and lateral shakes which are now applied separately to these endless-belt machines.

In respect to our second improvement our object is to be able to use a belt without permanent flanges, (an advantage both in operation and in manufacture,) and still provide for the necessary sluice on top, by temporarily raising the edges in such a manner and by such means as will avoid all friction or chafing, and thus will add materially to the life of the belt, as we shall hereinafter show.

Referring to the accompanying drawings, Figure 1 is a perspective view of our improved concentrator. Fig. 2 is a detail view, showing one of the carrier-belts; and Figs. 3 and 4 are details showing the traveling carrier.

A represents a suitable base-work or foundation, above which is sustained the frame B by means of rods C loosely hooked or linked to or supported on the horizontal bed-pieces. The frame B should have an upward inclination to one end, either by reason of the different lengths of the standard-rods C, or because of the formation of the base-work, or from any other cause. This is usual to machines of this class, and may be variously accomplished.

Mounted on or in the frame B are a number of transverse rollers, D. At the head or upper end of the frame B is mounted the driving-roller E, which derives motion through a pulley, F, connected suitably with the source of power, unnecessary to show here. At the lower end of the frame B is mounted a roller, G.

In concentrators of this class there is usually a water-tank at some point under the frame B, and suitably-mounted directing-rollers are placed in position to guide the traveling belt down into the tank in order to wash off the concentrations.

H represent the endless belt, the upper portion being shown in plain lines and the lower portion in dotted lines, Fig. 1, said belt passing from the lower large roller, G, over the top of the frame B, traveling on its rollers D to and around the driving-roller E at the head. From here it passes down into an underlying water-tank, (not shown,) and up again under the frame to the lower roller, G, and the point of beginning.

At the head of the frame B are the water and ore distributers, (marked I and J, respectively.)

Mounted in the bed-frame at each end are vertical shafts K, the upper ends of which are bent to form cranks *k*. The ends of these cranks are fitted in bearings *b* on the sides of the frame B. Upon the shafts K, just below their cranks, or otherwise suitably placed, are pulleys *m*, connected by a belt, M. A pulley, N, upon that shaft K nearer the head of the machine should be connected by suitable means with the source of power, so that the frame B and belt H traveling over it may receive a rotary shake through the medium of the cranks *k* on shafts K, pulleys *m*, and endless connecting-belt M.

The operation of the concentrator as far as explained is obvious. The endless belt is driven by the head-roller E. The ore is discharged upon the belt, and meeting a downwardly-flowing stream of water from the water-distributer, the lighter portions are carried down with the water into any suitable receptacle, while the heavier and precious portions resist the flow of the water, and, clinging to the belt, are carried around and washed off in the tank below. But it has been found that this result is better obtained if a shaking motion be given to the traveling belt in order to agitate the body or layer of ore and open it out to the flow of water. Accordingly, by means of various devices the belt has been given a

separate "side shake," and also a separate "end shake," as they are familiarly termed; but as far as we are aware a rotary shake has never been imparted to it. This we accomplish by the means shown and described. The frame B, being supported on the swiveled or loosely-connected rods C, may yield as directed, so that it and the belt traveling over it receive through cranks *k* a rotary shake. The advantage of the rotary shake, added to the known capacity of endless traveling belt machines, makes a concentrator capable of producing new and useful results.

The belts used in these machines are made of rubber, and usually have permanently raised edges of some description, in order to form a sluice to hold the water and ore on their surfaces; but for some reasons—as, for example, economy in manufacture, and perhaps a better result in washing off the concentrations underneath—a belt without permanent flanges is found better for the purpose. When such a belt is used provision must of course be made to raise its edges to form a sluice when passing over the top of the frame, and to allow them to straighten out again after passing the water-distributer. Passing the edges over raised stationary guide-cleats on the upper side of the frame has been attempted; but the fatal objection to this is the friction, whereby an expensive belt is soon rendered worthless through wear. Rubber will not bear much friction or chafing, yet these must be present when the belt is dragged along over a stationary surface, and when the belt is as expensive as these are it becomes a matter of importance to prevent undue wear and to preserve the belt as long as possible.

Our improvement is operated as follows: We make an endless belt, P, preferably of rubber, of a suitable width—that is to say, sufficiently wide to turn the edge of the main belt H up. These belts P we preferably make with a sloping top, as shown in Figs. 2 and 3 and 4. We have two such belts, and place one on each end of rollers D. They travel over the tops of the rollers, around the end ones of the series, and underneath. They are placed so that their sloping tops extend inwardly, as in Fig. 3, and, as shown, the edges of the main belt lie upon and are raised by them. When the main belt meets the lowest roller D of the series its edges and the carrier-belts P come together, whereby the edges of the main belt are raised to form the sluice. The edges do not slip over the carrier-belts, but the two travel together at the same rate, so that there is no friction or chafing whatever. When the head roller D of the series is reached the main belt and its carrier-belt separate, whereupon the edges of the former straighten out. We could, of course, direct these carrier-belts in other ways than as here described—as, for instance, make them follow around the large end pulleys—and, though not desirable, they could be made to follow around the same course as the main belt, or be secured thereto in any known manner. We prefer, however, to arrange them as here shown, both for convenience and economy.

We are also aware that concentrating-tables adapted to receive a forward and side motion are old, and such we do not wish to be understood as claiming, broadly, as of our invention.

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

1. In an ore separating or concentrating apparatus, an endless revolving belt adapted to receive ore-pulp and water upon its surface and convey the heavier concentrations against and through the flow of water, and revolving carrier-belts, in combination with mechanism for imparting to said revolving belts a rotary shaking motion, substantially as herein shown and described.

2. In an ore separating or concentrating apparatus, an endless belt, revolving carrier-belts, and a swinging frame provided with rollers over which said belts pass, in combination with mechanism for imparting to said belts and roller-frame a rotary shaking motion, substantially as herein shown and described.

3. In an ore separating or concentrating apparatus, an endless belt and a swinging frame provided with rollers over which said belt travels, in combination with mechanism for imparting to said belt and roller-frame a rotary shaking motion, consisting of the belt M, vertical revolving shafts K, having cranks *k*, mounted in bearings *b* in the side of the swinging frame, substantially as herein shown and described.

4. In an ore separating or concentrating apparatus, an endless revolving belt, in combination with carrier-belts under its edges for raising them to form flanges, and means for causing said carrier-belts to travel with the revolving belt, substantially as and for the purpose specified.

5. In an ore separating or concentrating apparatus, the frame B and rollers D, mounted thereon, and the endless belt H, traveling over said rollers, in combination with the endless carrier-belts P, which travel upon and around the series of rollers D under the edges of the main belt, whereby said edges are temporarily raised and carried, substantially as and for the purpose specified.

In witness whereof we hereunto set our hands.

JOHN M. ADAMS.
WILLIAM F. CARTER.

Witnesses:
E. W. SKELTON,
J. H. BLOOD.