(No Model.)

T. A. EDISON.

METHOD OF AND APPARATUS FOR SEPARATING ORES.

No. 476,991. Patented June 14, 1892.

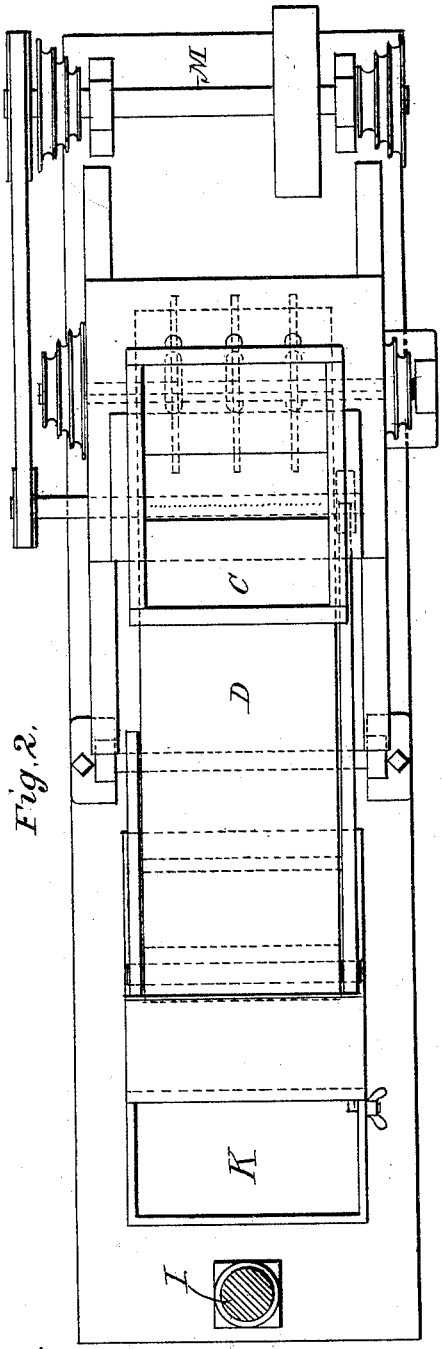

Fig. 2.

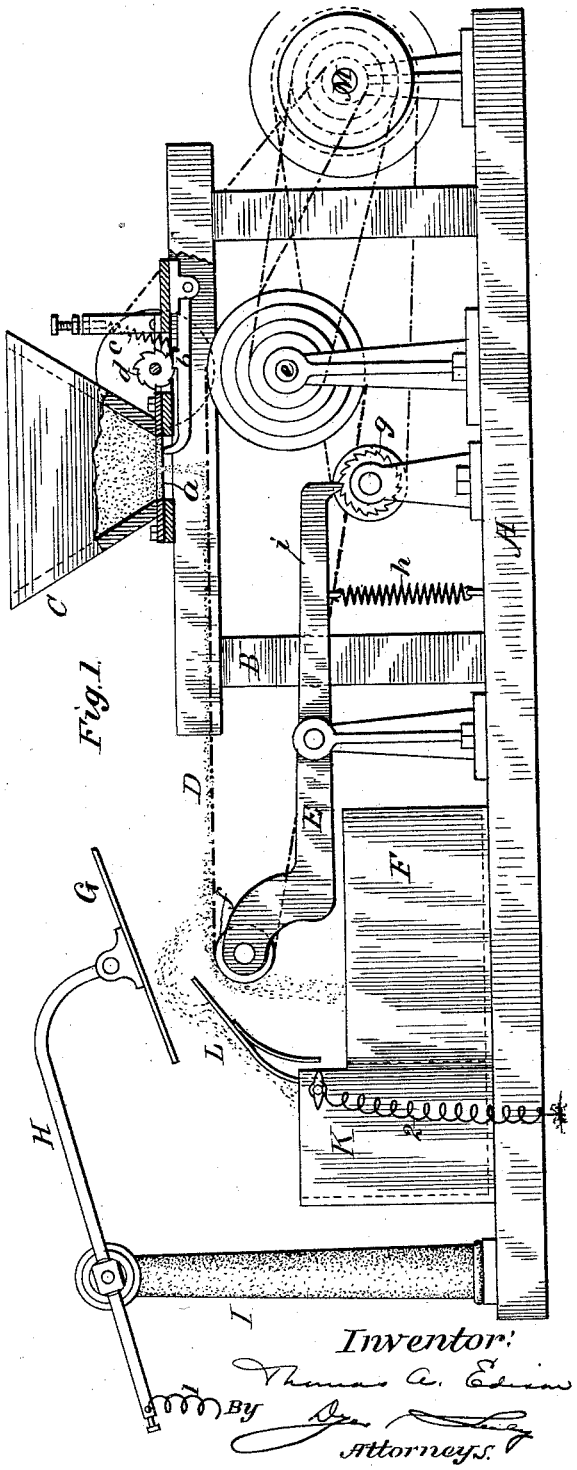

Fig. 1.

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

METHOD OF AND APPARATUS FOR SEPARATING ORES.

SPECIFICATION forming part of Letters Patent No. 476,991, dated June 14, 1892.

Application filed May 21, 1888. Serial No. 274,586. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Methods of and Apparatus for Separating Ores, (Case No. 771,) of which the following is a specification.

The object I have in view is the production of an apparatus for separating gold or other non-magnetic ore from the quartz by a dry process. I have found that in some if not all of the various rebellious ores the gold is in a free state, but is in an exceedingly finely-divided condition, so that it cannot be profitably and practically separated from the quartz by the ordinary methods. By reducing this ore to a pulverulent condition of such fineness that the particles of gold are separated from the quartz I have found that I can divide the body of pulverulent material by electrical action so as to recover the gold. This I accomplish by means of an electrified body, preferably a statically-charged plate, beneath which the pulverulent material is carried in a thinly-spread-out condition, the statically-charged body or plate acting against gravity and lifting the quartz particles by reason of their less specific gravity and delivering them to one receptacle, while the gold particles by reason of their greater specific gravity are carried to another receptacle. The gold particles being many times the specific gravity of the quartz particles, I have found it possible to adjust the relation of the electrified body to the moving material so that the quartz will be lifted but the gold will not.

In carrying out my invention I employ a horizontally-moving endless belt, to the upper side of which at one end the pulverized ore is delivered in a thinly-spread-out condition, so that as nearly as possible all the particles of gold and quartz will be separated upon the belt. To make this delivery effective, I preferably employ the hopper described in my application for patent already filed, Serial No. 268,749. Beneath the opposite horizontal end of the belt is a proper receptacle for receiving the gold particles which pass over the end of the belt. Directly over this end of the belt and a little in advance of it is placed an electrified metal plate, which is adjustably mounted upon a metal arm carried adjustably by a standard of hard rubber or glass, the plate being adapted for adjustment both horizontally and vertically and so as to change its angle of relation to the surface of the belt, in order that the precise position for effective working can be obtained. Projecting toward the belt and slightly over its end is a guiding-plate which enters the space between the belt and the electrified plate, and is inclined away from the belt to a receptacle for receiving the quartz. The arm carrying the electrified plate is connected with a static machine—such as Holtz's machine—or an induction-coil, while the guiding-plate is provided with a connection with the earth. I have found it desirable to vibrate the bottom plate of the hopper in order that the pulverulent material may readily pass through the small holes in the hopper-bottom, and I have also found it desirable to vibrate vertically the end of the belt at which the electrical action takes place, in order to prevent the particles from sticking to the belt. The pulverized quartz and gold being delivered to the belt in a thinly-spread-out condition, the particles as they approach the electrified body at the end of the belt will be electrified and the lighter quartz particles will be attracted with sufficient force by the electrified plate so that they will be lifted from the belt and will approach the plate, being not only lifted by this action, but also moved horizontally a sufficient extent to bring them over the end of the inclined guiding-plate which is connected with the earth. The particles do not strike and stick to the electrified plate; but as they approach it they seem to become fully electrified and to be repelled by the plate or to succumb to the superior attraction of the grounded guiding-plate assisted by gravity, since after curving over the end of the grounded guiding-plate they drop down upon it and are discharged of their electricity by the earth connection and pass into the receptacle to which the guiding-plate leads.

In the accompanying drawings, forming a part hereof, Figure 1 is a side elevation and partial section of the apparatus, and Fig. 2 is a top view of the same with parts removed.

A is a suitable base, from one end of which

rises a frame B, carrying the hopper C. This hopper has a flat bottom plate *a*, provided with small discharging-holes, as described in the application referred to. This bottom plate is kept in vibration by a number of arms *b*, which are held up against the bottom plate by springs *c*, and are successively depressed by ratchet-wheels *d*, so that the pulverulent material carried by the hopper is caused to pass through the openings in the bottom plate.

D is an endless belt, which passes around a drum on the shaft *e*, which is mounted in stationary bearings near the hopper. At the other end the belt passes over a drum *f*, journaled in the ends of the vibrating frame E, such frame being vibrated by a ratchet *g* and a spring *h*, acting oppositely upon a lever *i*, extending rearwardly from the pivot of the frame.

F is a receptacle beneath the discharging end of the belt. Over this discharging end of the belt is a metal plate G, mounted adjustably on the end of a metal arm H, which is secured adjustably to a post I of india-rubber.

K is a receptacle placed beyond the discharging end of the belt and having a guiding-plate L of metal, which projects upwardly and toward the belt into the space between the end of the belt and the plate G. One pole of a Holtz machine is connected by wire 1 to the arm H, while the guiding-plate L is connected by wire 2 with the earth. The driving-shaft M is connected with a suitable source of power and is connected by belts with the shaft *e* for driving the endless belt with the shaft of the ratchet-wheels *d* for vibrating the bottom of the hopper, and with the shaft of the ratchet-wheel *g* for vibrating the frame E. The belt D is shown for clearness in Fig. 1 in dotted lines; but it will be understood that it is a belt of solid material, such as cloth, rubber, or leather. The quartz being of far less specific gravity than the gold, the action will be the lifting of the quartz by the electrified plate G over the end of the guiding-plate L, whence it drops upon such guiding-plate and is delivered to the box K, while the gold is delivered to the box F, as has already been explained.

What I claim as my invention is—

1. In a machine for separating pulverulent material composed of particles of different specific gravities, the combination, with a traveling belt, of an electrified plate placed over the belt at the end thereof toward which the upper side of the belt moves for attracting the lighter particles against the force of gravity, and separate receptacles adjacent to said end to receive the lighter and heavier particles, respectively, substantially as set forth.

2. The combination, in a machine for separating pulverulent material composed of particles of different specific gravities, of a traveling belt, means for feeding pulverulent material onto it, an electrified body over the belt at the end toward which the upper side of the belt moves, and a guide-plate for the lighter particles projecting over the belt at said end and below the electrified body, substantially as described.

3. In a machine for separating pulverulent material composed of particles of different specific gravities, the combination, with a traveling belt, of an electrified plate located over the belt and a grounded guiding-plate located between the electrified plate and the belt, substantially as set forth.

4. The combination, in a machine for separating pulverulent material composed of particles of different specific gravities, of a traveling belt supported on suitable rollers, means above the belt at one end to attract some of the particles of the pulverulent material on the belt, and means for agitating the belt at said end, consisting of a pivoted arm or frame supporting the belt-carrying roller, and means for moving the arm or frame on its pivot, substantially as described.

5. The combination, in a separating appatus, of a traveling belt, means for spreading pulverulent material thereon, and an attracting plate or device above and in advance of or extending beyond said belt, whereby as the belt carries the material along the light particles will be raised by attraction and carried forward, thereby being separated from the heavier particles, substantially as described.

This specification signed and witnessed this 9th day of May, 1888.

THOS. A. EDISON.

Witnesses:
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