(No Model.)

C. J. REED.

ORE SEPARATOR.

No. 466,513. Patented Jan. 5, 1892.

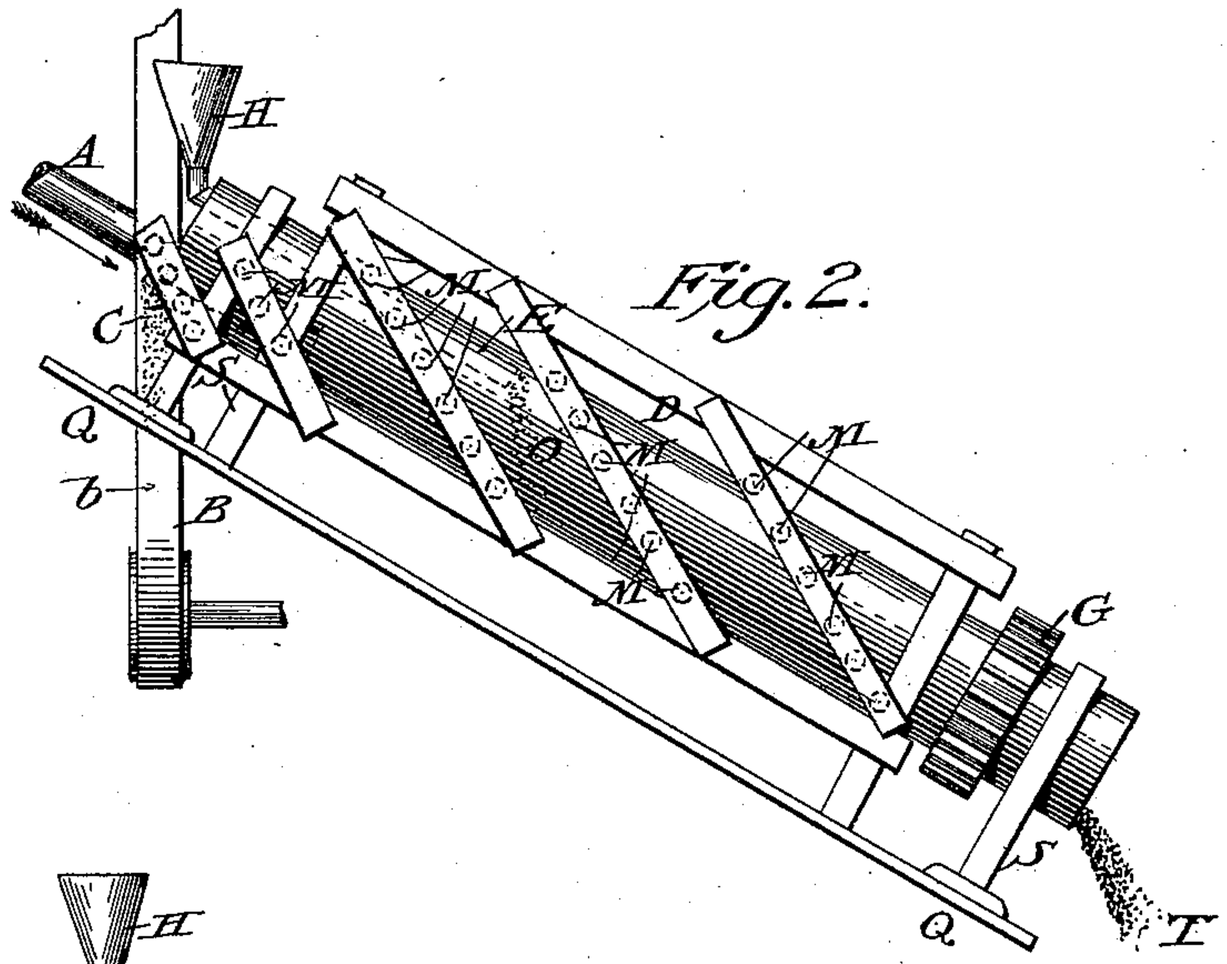

Fig. 2.

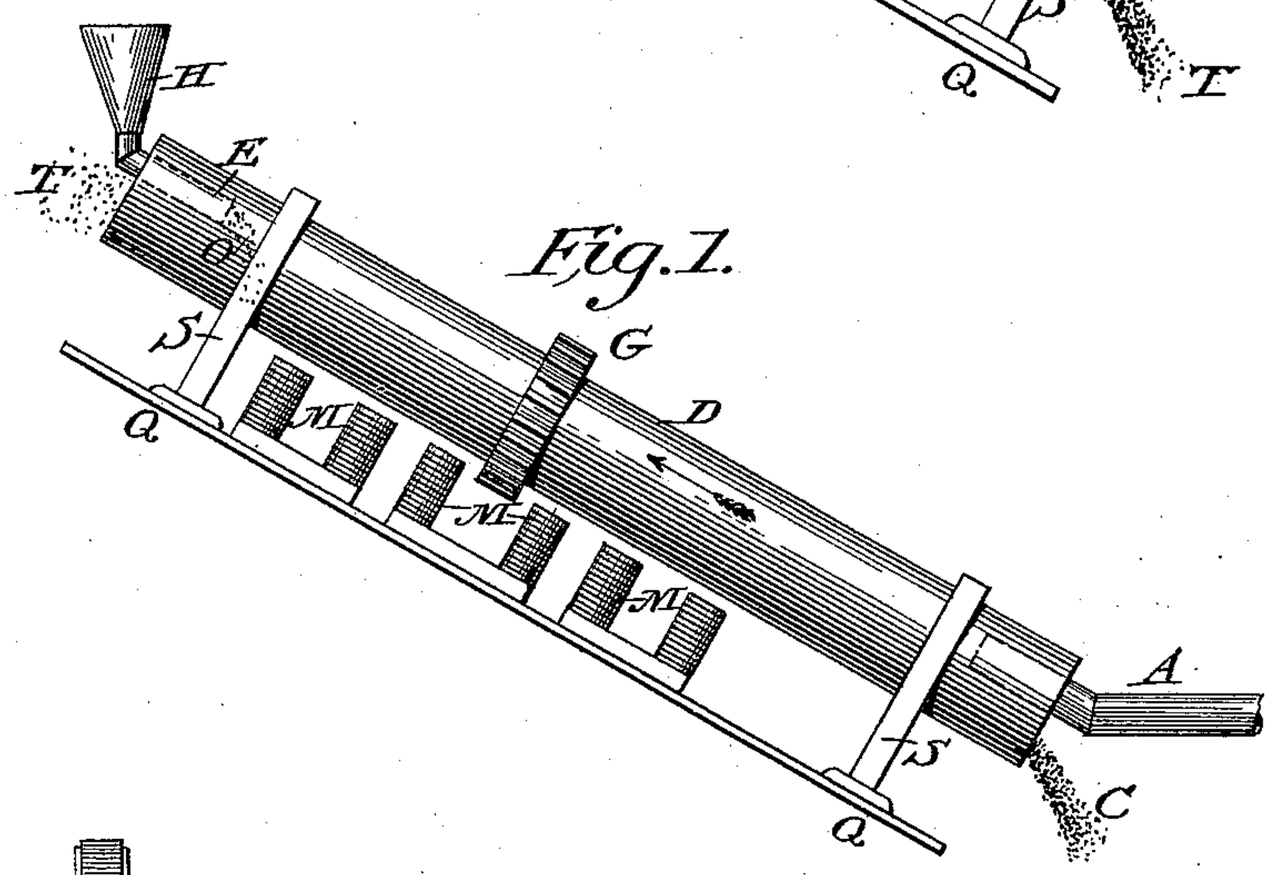

Fig. 1.

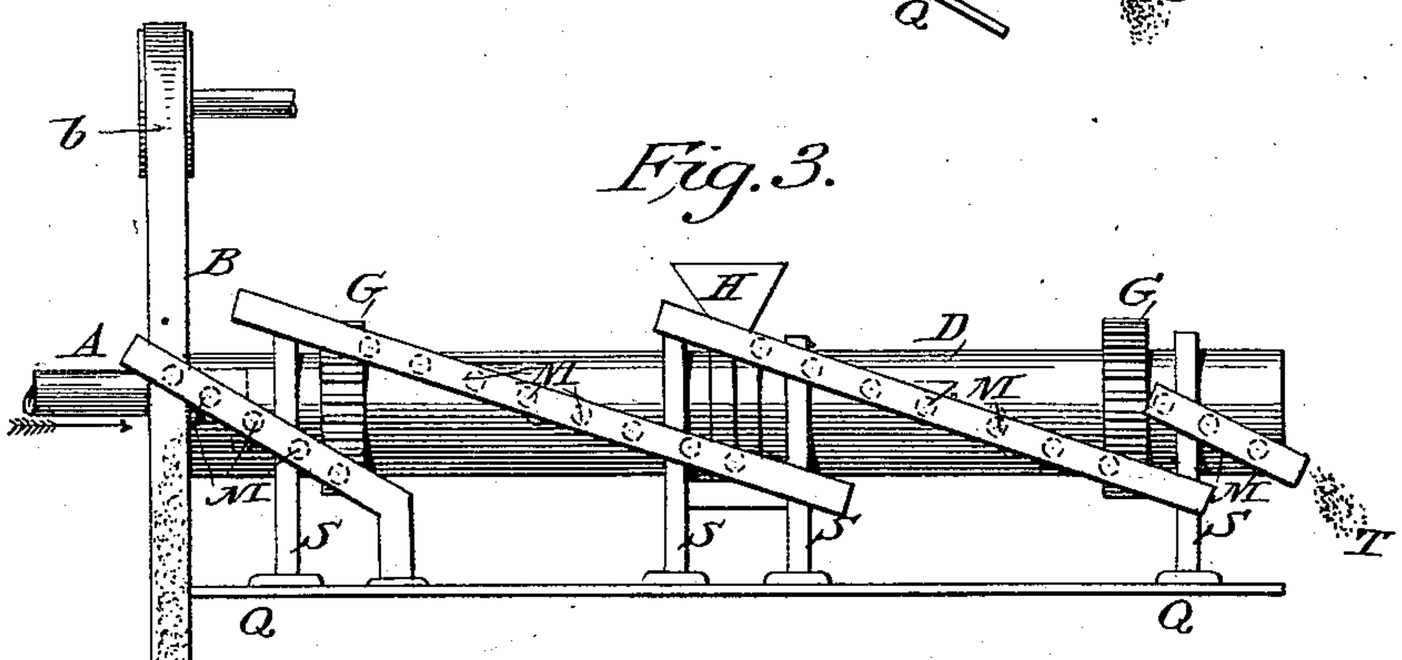

Fig. 3.

Witnesses.

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SPECIFICATION forming part of Letters Patent No. 466,513, dated January 5, 1892.

Application filed October 13, 1890. Serial No. 368,050. (No model.)

To all whom it may concern:

Be it known that I, CHARLES JOHN REED, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Ore-Separating Machines, of which the following is a specification.

My invention relates to improvements in ore-separating machines in which a revolving drum operates in conjunction with fixed magnets and a current of air and gravity.

The object of my invention is to provide a means of separating mixtures of powdered minerals and chemicals, of separating magnetic from less magnetic or non-magnetic particles, and dense from less dense particles. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the entire machine arranged for separating particles in a finely-powdered state. Fig. 2 is a side view of the entire machine arranged for separating particles in a coarsely-powdered state. Fig. 3 is a side view of the entire machine arranged for the separation of particles in either a finely-divided or coarsely-powdered state.

Similar letters refer to similar parts throughout the several views.

D is a revolving drum, cylindrical in form, and revolving in suitable supports S S, and receiving its motion from a suitable pulley or gearing G.

H is a hopper or feed-box into which the mixture in a powdered condition is placed.

Q Q is a solid support or frame-work which holds the mechanism in proper position.

A represents an air-pipe through which a current of air is blown into the interior of D in the direction indicated by the arrow.

C represents magnetic particles or concentrates, and T represents non-magnetic particles or tailings.

M represents magnets fixed in position and having their poles close to the exterior of D, but not in actual contact.

In Figs. 1 and 2, E is a tube connecting with H and extending into D, and conveying the mixture O into the interior of D. This tube is shown in broken lines in Figs. 1 and 2 and is not shown in Fig. 3.

In Figs. 2 and 3, B is a flexible belt having a downward motion derived from pulleys over which it passes. In Fig. 1 this belt is not shown.

In Fig. 1 the magnets M are placed in a line under the revolving drum D. In Figs. 2 and 3 the magnets M are arranged at one side of D in several ascending rows.

The operation of my invention is as follows:

First, as shown in Fig. 1, the drum D is inclined at any suitable angle between the horizontal and vertical, and is made to revolve in either direction about its axis. A current of air is blown from A through the drum, entering the lower end and passing out at the upper end. The finely-powdered mixture passes through H into E, through E into D at O. The motion of D keeps the powder thoroughly agitated while the magnets M draw the magnetic particles down and hold them against the lower side of D. Gravity and the motion of D cause these magnetic particles to move slowly downward and finally pass out at C. While this is going on, the current of air blows all non-magnetic particles out at the upper end of D at T. The agitation of the magnetic particles by the motion of the drum enables the air-blast to remove all adhering and intermingled non-magnetic particles. The same apparatus without the magnets will separate dense particles from lighter particles, such as gold and silver from sand and earth.

Second, as shown in Fig. 2, the drum D is inclined at any suitable angle. The powdered mixture passes through H into E, through E into D, and falls at O near the middle of D. D is made to revolve so that the side nearest the magnets M moves upward. The magnetic particles are drawn and held against the side of the drum adjacent to the magnets. The motion of the drum moves the magnetic particles upward from one magnet to a region where they are attracted by the magnet next above in the series. The particles pass gradually from the lowest magnet diagonally upward to the top of the series and then fall upon the next series above. They are thus carried gradually and with continual agitation against gravity to the upper end of the drum, thence out against the belt B, which passes between the highest magnet and the

upper end of D. The downward motion of this belt carries the particles down away from the influence of M and they fall at C. The non-magnetic particles of ore are carried downward by gravity and the current of air from A and fall out at T.

Third, as shown in Fig. 3, the drum consists of two cylinders D D, having their adjacent ends close together and their axes of revolution in the same line, and having a common motion. The hopper H is placed between the adjacent ends of the cylinders and is held by any suitable support F. Otherwise the arrangement is similar to that shown in Fig. 2. The drum may be adjusted to a horizontal position, as in Fig. 3, or at any desired inclination. When the drum is horizontal the tailings T are driven out by the combined action of the air-blast from A and the rotary motion of the drum. It is evident that the drum may be made conical or bell-shaped, or of some other form approximating that of the cylinder. It is also evident that the magnets may be of any form and number and may be arranged in a great variety of positions around the revolving drum. All these forms of drum and arrangements of the magnets are here contemplated and covered in this application. It is also evident that a current of water or other liquid may be used instead of the air-blast.

I disclaim all combinations in which revolving drums have magnets inside and the ore is separated outside of the drum; also all combinations of magnetic rolls outside of which the ore is separated. I disclaim all combinations of a revolving screen or sieve with a feed box or hopper.

I am aware that prior to my invention magnetic separators have been made with fixed magnets and revolving drums. I therefore do not claim such a combination, broadly; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an ore-separator, a hollow revolving drum through which the ore passes longitudinally, in combination with a fixed magnet outside of the drum, substantially as herein set forth.

2. In an ore-separator, a hollow revolving drum through which the ore passes longitudinally, in combination with fixed magnets outside of the drum, substantially as herein set forth.

3. In an ore-separator, a hollow revolving drum through which the ore passes longitudinally, in combination with fixed magnets outside of the drum and an air current or blast, substantially as herein set forth.

4. In an ore-separator, a hollow revolving drum through which the ore passes longitudinally, in combination with fixed magnets outside of the drum, an air current or blast, and a hopper or feed-box, substantially as herein set forth.

5. In an ore-separator, a hollow revolving drum through which the ore passes longitudinally, in combination with fixed magnets outside of the drum, an air current or blast, a hopper or feed-box, and a traveling belt, substantially as herein set forth.

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Witnesses:
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