2 Sheets—Sheet 1.

E. B. HASTINGS.

Ore-Separator.

No. 207,867. Patented Sept. 10, 1878.

Fig. 1.

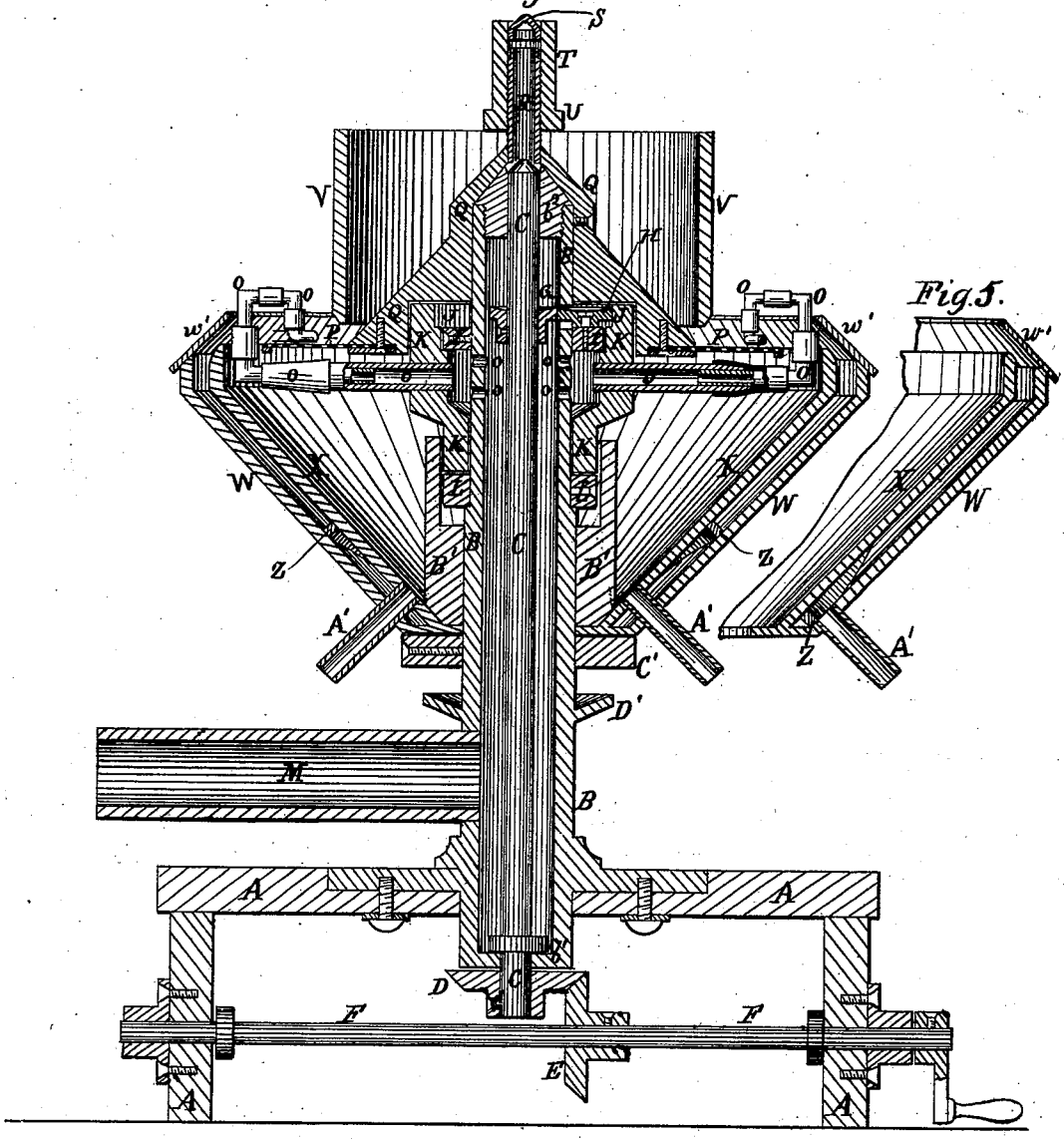

Fig. 5.

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2 Sheets—Sheet 2.

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Fig. 2.

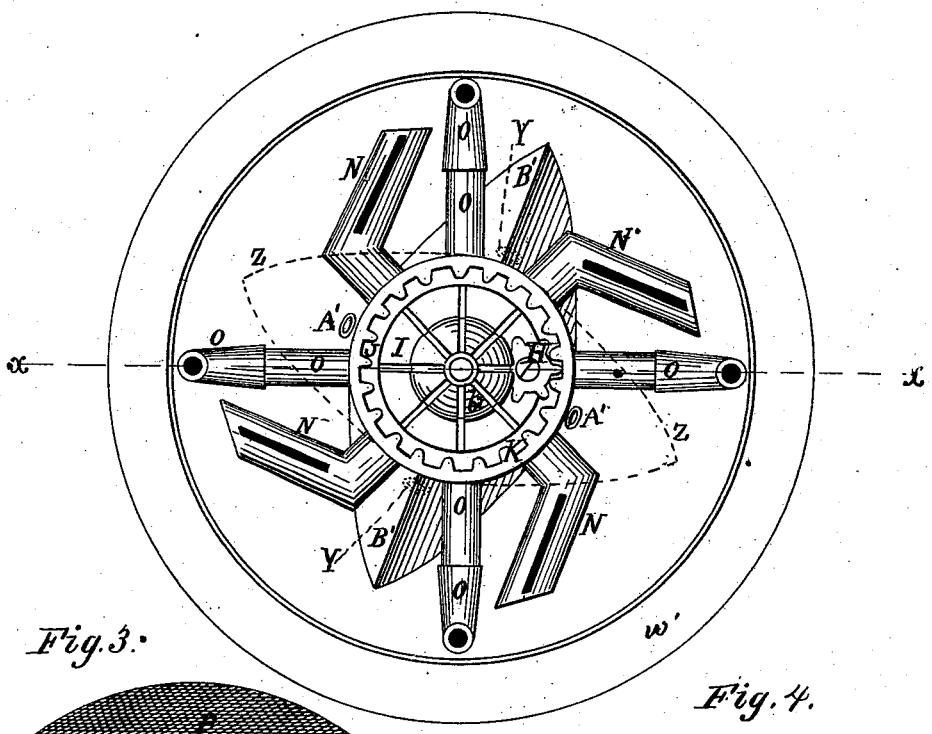


Fig. 3.

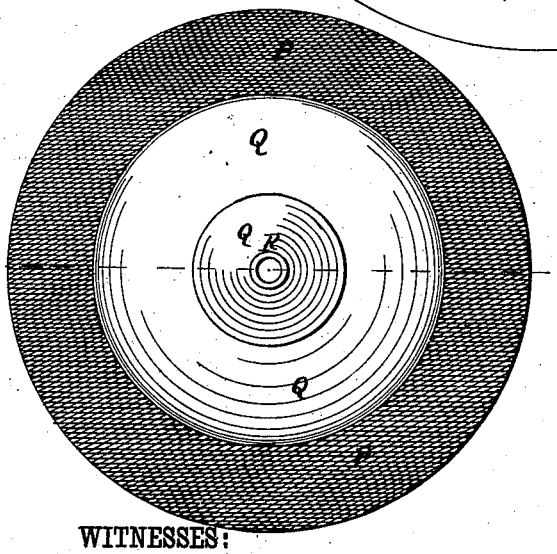
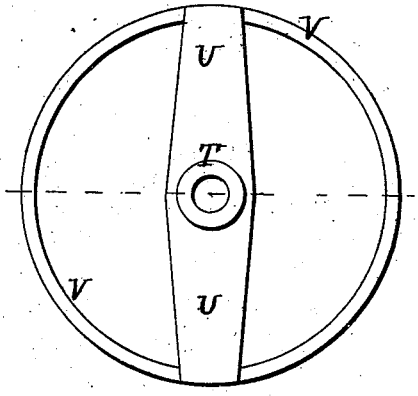


Fig. 4.



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UNITED STATES PATENT OFFICE.

EMORY B. HASTINGS, OF PALMER, MASSACHUSETTS.

IMPROVEMENT IN ORE-SEPARATORS.

Specification forming part of Letters Patent No. **207,867**, dated September 10, 1878; application filed July 18, 1878.

To all whom it may concern:

Be it known that I, EMORY B. HASTINGS, of Palmer, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Machines for Separating Ores, &c., of which the following is a specification:

Figure 1 is a vertical section of my improved machine, taken through the line *x x*, Fig. 2. Fig. 2 is a top view of the machine, the feed-cylinder, cone and ore-bed being removed. Fig. 3 is a detail top view of the feed-cone and ore-bed. Fig. 4 is a detail top view of the feed-cylinder and its supporting bar and nut. Fig. 5 is a detail sectional view of the inner and outer cones and the discharge-opening communicating with the space between said cones.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved machine for separating ores, and other similar uses, which shall be so constructed as to treat finer and coarser particles with the same success, which may be easily adjusted to operate upon different grades, and which shall be simple in construction, may be easily oiled, and shall have all its wearing-surfaces protected from dust.

The invention consists in the combination of the hollow post, provided with an air-inlet pipe and perforated in its upper part, the vertical shaft, the three gear-wheels, the two collars, and the hollow cylinder, provided with radial blast-pipes, with each other; in the combination of the feed-cone, the adjustable feed-cylinder, and the ore-bed with the hollow post, provided with perforations, the bearing, and the hollow cylinder; in the combination of the radial pipes having their outer parts inclined to the rearward and provided with slits in their upper sides, and the radial pipes having their outer parts bent upward, inward, downward, and inclined outward, with the hollow cylinder and the ore-bed; and in the combination of the outer inverted cone, provided with the inclined flange, the discharge-pipes, and the chutes, and the inner inverted cone, provided with the discharge-pipes and the chutes, with the hollow post, to receive the separated ore as it is blown from the ore-bed, as hereinafter fully described.

A is the base or pedestal of the machine, to the center of the top of which is firmly secured the lower end of a hollow cylindrical post, B. The ends of the hollow post B are closed by bearings b^1 b^2, in which revolves the vertical shaft C.

To the lower end of the shaft C is attached a bevel-gear wheel, D, the teeth of which mesh into the teeth of the bevel-gear E, attached to the horizontal shaft F. The shaft F revolves in bearings attached to the base A, and motion is given to it from any convenient power.

If desired, the shaft F may be omitted, and the driving-power connected directly with the vertical shaft C.

To the upper part of the shaft C is secured, by a set-screw or other convenient means, a gear-wheel, G, of such a size as to work freely within the cavity of the hollow post B, and the teeth of which mesh into the teeth of the small gear-wheel H.

The inner side of the gear-wheel H projects through a slot in the side of the hollow post B, and the said gear-wheel is pivoted to a collar, I, fitted upon the hollow post B, and is secured in place by a set-screw or other convenient means. The teeth of the small gear-wheel H also mesh into the gear-teeth J, formed upon the inner surface of the upper part of the hollow cylinder K. The inner surface of the cylinder K, just below the gear-teeth J, fits upon the outer surface of the collar I, which thus serves as its upper bearing.

The lower part of the cylinder K is contracted to fit upon the hollow post B, and its lower end rests upon a collar, L, fitted upon the said hollow post B, and secured to it by a set-screw or other suitable means.

With the lower part of the hollow post B is connected the inner end of a pipe, M, the outer end of which is designed to be connected with an air-pump, a fan-blower, a reservoir of condensed air, or other means of supplying a steady blast of air. The pipe M should be provided with a stop-cock or valve, to enable the air-blast to be regulated as may be required.

The cavity of the hollow post B and the

cavity of the cylinder K are connected by perforations formed through the wall of the said post B, just below the collar I.

The walls of the cylinder K are perforated for the reception of a series of straight radial pipes, O, and a second series of obtuse-angled or radially-projecting elbow-pipes, N, which pipes alternate in position with each other, as is shown in Fig. 2. The outer portions of the pipes N terminate in close proximity to the pipes O, and are provided with top slits, through which the blast escapes against the wire-gauze or bed P.

The pipes O, at the outer edge of the ore-bed P, are bent upward and then inward, downward, and forward. The forward parts or nozzles of the pipes O are horizontal and incline outward, as shown in Fig. 1.

The bent parts of the pipes O are made in separate pieces, connected by air-tight couplings, so that their ends or nozzles may be adjusted to give the desired direction to the blast.

The wire-gauze of the ore-bed P is made ring-shaped, and is attached to a ring-shaped frame, which is attached to the base of a cone, Q. The cone Q is recessed to receive the upper part of the air-cylinder K, the upper part of the hollow post B, and the conical upper end of the bearing b^2, upon which the said cone Q rests. The cone Q is secured to the hollow post B by a set-screw or other suitable means.

In the apex of the cone Q, in line with the shaft C, is formed a hole, in which is secured the lower end of a hollow screw, R, the upper end of which is closed by a detachable cap, S.

Upon the screw R is screwed a long nut, T, the lower end of which is formed solid with, or is rigidly attached to, the center of a cross-bar, U. The ends of the cross-bar U are formed solid with, or are firmly attached to, the upper edge of a hollow cylinder, V, the lower edge of which extends down to, or nearly to, the ore-bed P at the outer edge of the base of the cone Q.

The ore to be operated upon is introduced into the space between the cone Q and the cylinder V, and passes beneath the lower edge of the said cylinder to the ore-bed P, the rapidity of feed being regulated by turning the cylinder V down or up, as required. With this construction, as the pipes N O are carried around by the gearing the vertical blasts from the slits in the pipes N raise the ore from the different parts of the ore-bed P in succession, move it a little toward the outer edge of the said ore-bed, and allow it to drop. The lighter particles of the ore will rise higher than the heavier particles and will fall slower, so that they will always be above the said heavier particles. The lighter particles of the ore, as they rise, come into the horizontal blast from the nozzles of the pipes O, and are blown against the inclined flange w', formed upon or attached to the upper edge of the outer inverted cone, W, by which they are guided into the space between the said outer cone, W, and the inner cone, X, and pass out, through the discharge-pipes Y, into some suitable receiver.

In the space between the two hollow cones W X are placed inclined chutes or partitions Z to guide the ore to the discharge-pipes Y. The heavier particles of ore drop from the outer edge of the ore-bed P into the cavity of the inner cone, X, and pass out through the discharge-pipes A′. The ore is guided to the discharge-pipes A′ by chutes or guides B′, placed in the cavity of the inner cone, X, and through the center of which the hollow post B passes. The hub of the chutes B′ is extended upward around the smaller lower part of the cylinder K, so as to prevent any dust from flying against and adhering to the oiled surface of the hollow post B.

The cones W X rest upon and are supported by a collar, C′, placed upon the hollow post B, and secured to it by a set-screw or other suitable means. Substantially the same effect may be obtained from the two blasts by making the cylinder K stationary and revolving the ore-bed P.

To the hollow post B, a little below the collar C′, is secured a ring-cup, D′, to receive the surplus or waste oil from the friction-surfaces of the machine. All the friction-surfaces of the machine are oiled from the hollow screw R, into the upper end of which the oil is poured, and which thus serves as an oil cup or reservoir.

The upper end of the hole through the bearing b^2 is slightly flared, and the upper end of the shaft C is made conical to form a space, in which oil rests and from which it passes down to the gear-wheel G and to the lower bearing of the said shaft C. The upper surface of the gear-wheel G is slightly concaved to retain oil, and cause it to pass to the grooves in the bore of the said gear-wheel, and pass on to the lower bearing of the said shaft.

In the outer surface of the conical upper end of the bearing b^1 and in the outer surface of the upper part of the hollow post B are formed grooves, through which the oil passes down to the gear-wheel H and the collar I. The upper surface of the gear-wheel H is slightly concaved, to retain oil and cause it to pass to the stud or pivot of the said wheel.

The upper surface of the collar I is grooved radially to conduct oil to the upper bearing of the cylinder K, from which it passes down through the said cylinder K to its lower bearing.

The inner ends of the pipes N O project a little beyond the inner surface of the cylinder K, so that the oil will not enter the said pipes. The surplus or waste oil passes down the hollow post B, and is caught by the waste-cup D′, from which it may be removed as desired.

By this construction all the friction-surfaces of the machine will be wholly protected from dust, and will all be oiled from a single cup or reservoir.

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

1. The combination of the hollow post B, provided with a pipe, M, and perforated in its upper part, the vertical shaft C, the gear-wheels G H J, the collars I L, and the hollow cylinder K, provided with radial blast-pipes, substantially as herein shown and described.

2. The combination of the feed-cone Q, the adjustable feed-cylinder V, and the ore-bed P with the hollow post B, provided with perforations, the bearing b^2, and the hollow cylinder K, substantially as herein shown and described.

3. The combination of the obtuse-angled or radially-projecting elbow-pipes N, provided with top slits, and the straight radial pipes O, having their outer parts bent upward, inward, downward, and inclined outward, with the hollow cylinder K and the ore-bed P, substantially as herein shown and described.

4. The combination of the outer inverted cone, W, provided with the inclined flange w', the discharge-pipes Y, and the chutes Z, and the inner inverted cone, X, provided with the discharge-pipes A′ and the chutes B′, with the hollow post B, to receive the separated ore as it is blown from the ore-bed P, substantially as herein shown and described.

EMORY B. HASTINGS.

Witnesses:
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C. SEDGWICK.