(No Model.) 3 Sheets—Sheet 1.

M. B. DODGE.

DRY ORE SEPARATOR.

No. 279,640. Patented June 19, 1883.

Fig. 1.

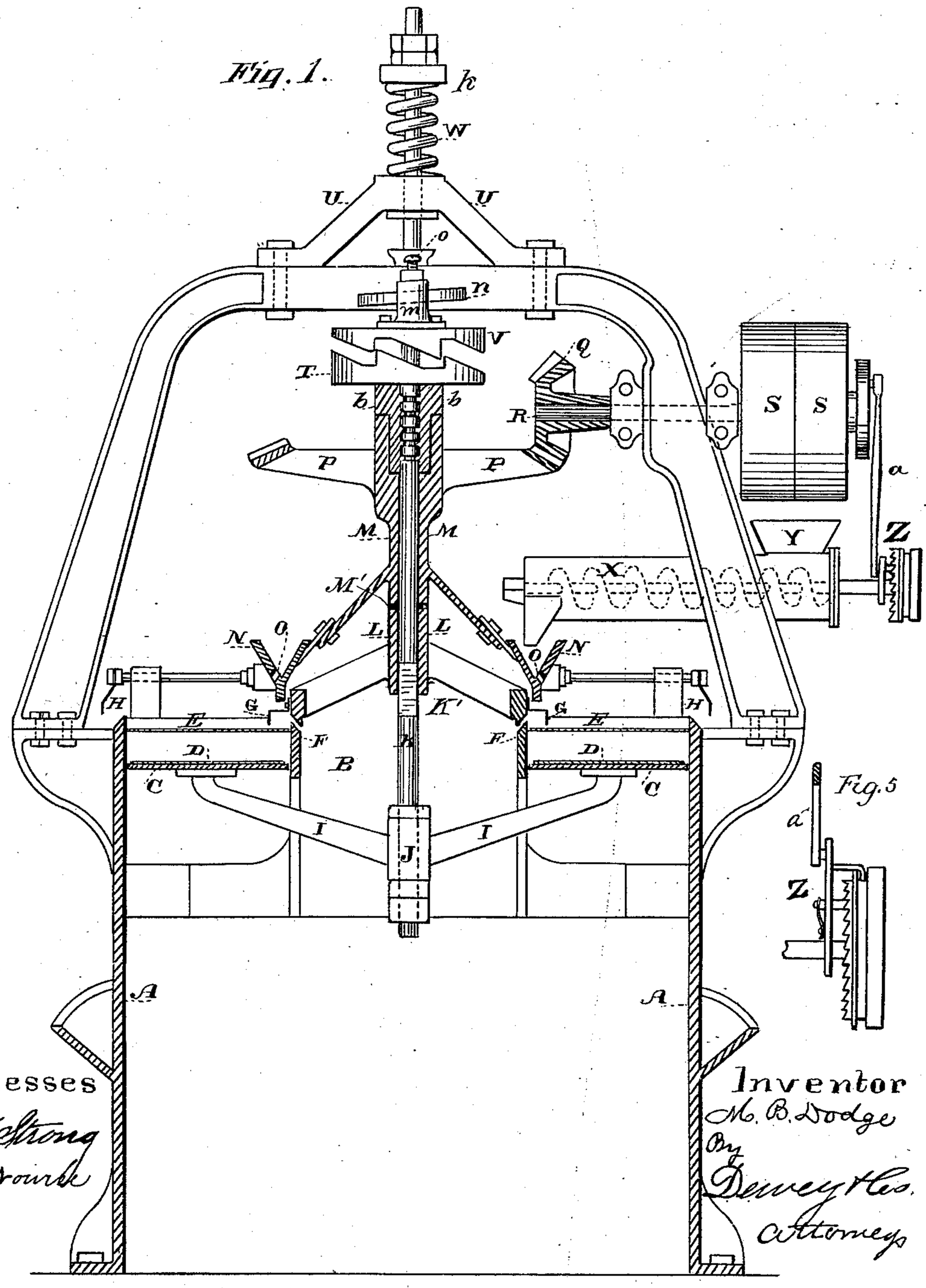

Fig. 5

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Fig. 2.

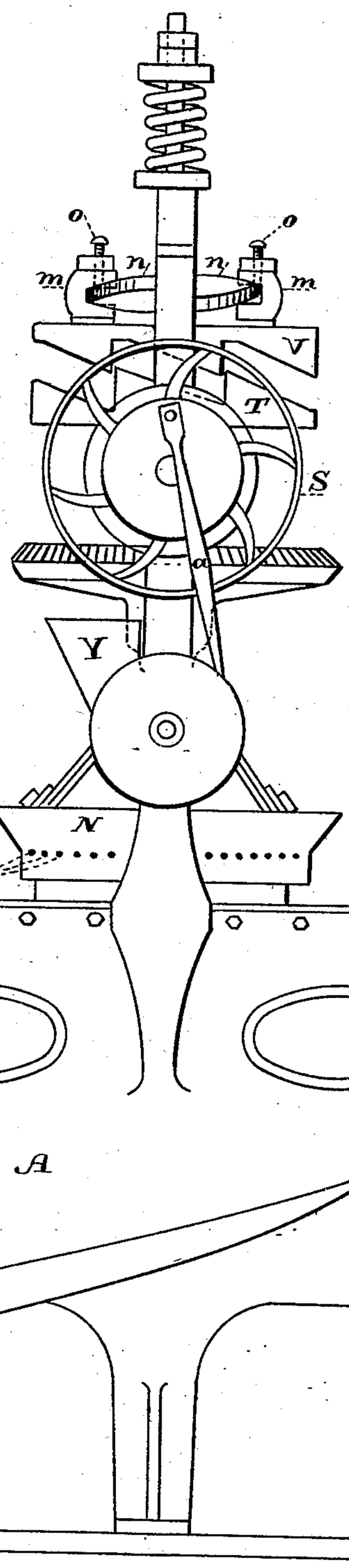

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Fig. 4.

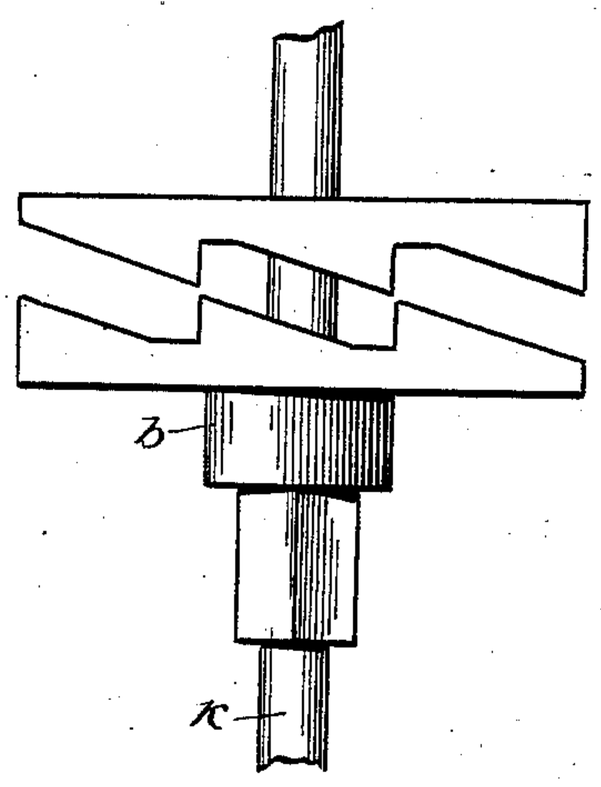
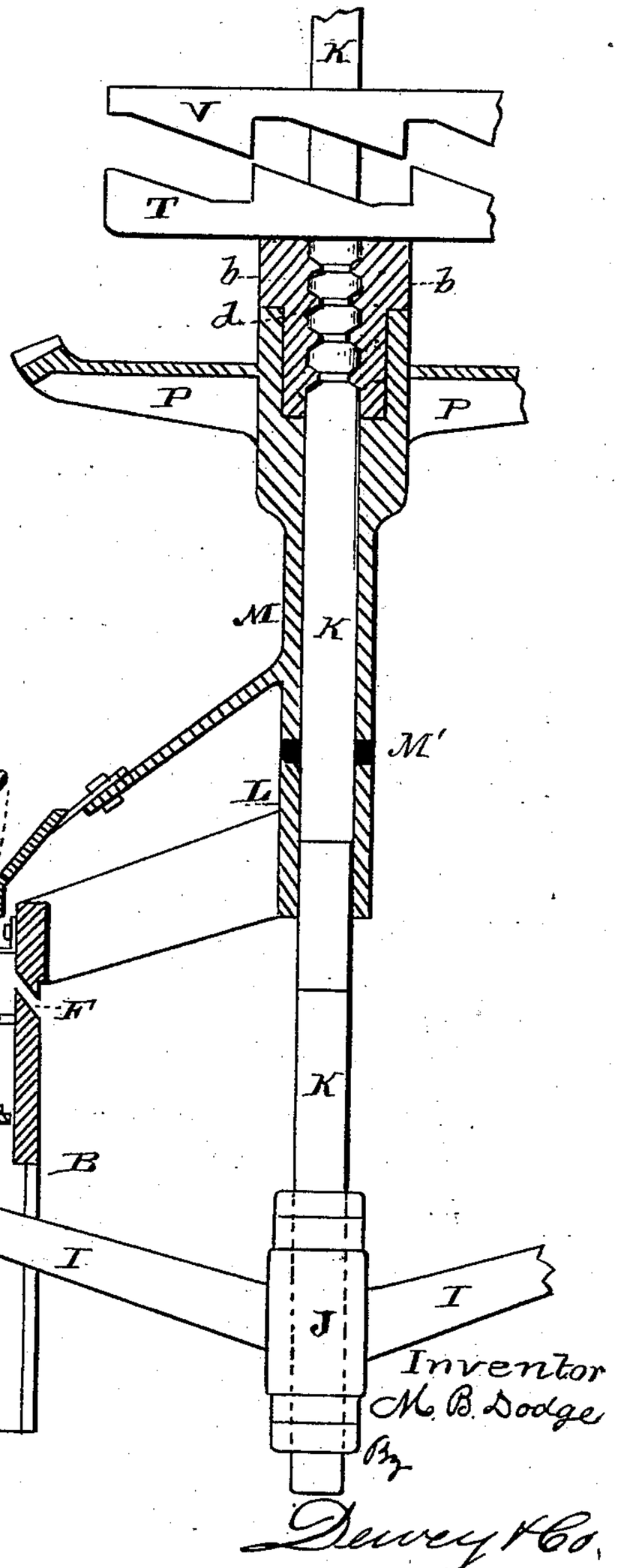


Fig. 3.



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UNITED STATES PATENT OFFICE.

MILES B. DODGE, OF SAN FRANCISCO, CALIFORNIA.

DRY-ORE SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 279,640, dated June 19, 1883.

Application filed October 10, 1882. (No model.)

To all whom it may concern:

Be it known that I, MILES B. DODGE, of the city and county of San Francisco, State of California, have invented an Improved Dry-Ore Separator; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an apparatus for the separation and concentration of gold and other valuable heavy metals, sulphurets, or other substances from the lighter sand and débris with which they may be mixed when in a dry state.

It consists of an annular ore-bed of wire screen covered with cloth, canvas, or other fibrous substance permeable to air, which is forced through it in intermittent blasts by an annular-shaped piston operated by a central stem or rod and a spring. Means are provided for discharging the light waste material toward the outside, as will be more fully explained by referring to the accompanying drawings, in which—

Figure 1 is a vertical section taken through the center of the apparatus. Fig. 2 is a side view. Figure 3 is an enlarged detail. Figs. 4 and 5 represent details.

A is a cylinder, which serves as a support for the different parts of the apparatus, and B is a smaller concentric cylinder supported within it, so as to extend downward a short distance from the top. The inside of the cylinder A and the outside of the cylinder B are bored or fitted to receive an annular piston, C, which is moved up and down a short distance, and is provided with upwardly-opening valves D, so that as it moves air may be admitted above it on the downstroke and forced upward by it on the upstroke. These valves may be of any suitable construction. One form which I have found convenient consists of a sheet of rubber secured at the four corners only, so that the edges will lift by pressure and allow a sufficient quantity of air to pass through. Above this piston is the annular ore-bed E, which is composed of wire-screen material, with a covering of cloth or other simliar material, through which the air may pass as it is forced up by the reciprocation of the piston. The ore-bed is situated a little below the level of the outer rim of the cylinder A, while the rim of the cylinder B is somewhat higher than the rim of A, and has holes F at a suitable height above the ore-bed, through which the ore or valuable heavy material may pass and fall down inside after it has accumulated to the height of the holes. A flange, G, projects from the side of the cylinder B, to which it is bolted, and extends down just below the level of the holes F, and this prevents the worthless material from reaching these discharge-openings, as the level of the valuable heavy material will always be above the edge of the flange.

Plows or scrapers H are driven from the central rotating shaft and pass around above the ore-bed, near its outer edge, to assist in throwing out the waste, which falls into a chute around the exterior of A, and is carried off by it.

The piston C has arms I, which extend through slots in the lower part of the cylinder B to a central hub, J, which is secured to the lower end of a vertically-moving rod, K. This rod extends up through a stationary sleeve, L, being made square, or having a feather at any point within said sleeve, so as to slide without turning. Above the sleeve L is another revolving one, M, which rests upon steel collars *m'* on the top of L, and carries the feed-hopper N, into which the material is placed, and from which it is discharged upon the ore-bed through holes O as the hopper is revolved. The sleeve M, to which the hopper is secured, has a horizontal gear-wheel, P, secured to its upper part, and this is driven by a pinion, Q, fixed to the shaft R, the whole being driven by a belt running upon the pulleys S. The sleeve M, at its upper end, at the point where the gear-wheel P is attached, is formed with a square socket (shown in Fig. 4) around the shaft, and within this socket fits the squared end of the hub *b*, the shoulders of said hub resting upon the upper edges of the sleeve M when in position. The shaft K at this point is provided with a series of annular grooves, and the hub *b* is provided with corresponding annular projections which fit into these grooves, and thus lock the hub to the shaft. Secured rigidly to the hub is a ratchet-disk, T. It is evident from this description that the shaft and hub may be raised and depressed

independently of the sleeve M, while at the same time the hub has rotary motion with it.

A spring, W, surrounds the shaft K and rests upon the top of the yoke or frame U. This spring, which is compressed, acts against a collar, *k*, upon the upper end of the shaft K, and when the latter is free lifts it up, carrying with it the sleeve *b* and the piston C.

A disk or cam, V, is fixed above the cam T to the frame U, and as this disk cannot revolve it will be seen that the revolution of the disk T will cause the two to be separated, and when the vertical portions of the cams coincide the spring W, acting upon the rod K, will draw it upward with a sudden movement, and with it the piston C, thus forcing the air up through the ore-bed with a sharp action, which tosses the material upon it intermittingly, and thus allows the heavier particles to settle to the bottom, while the lighter arrange themselves at the top and are discharged over the outer edge of the rim A, as before described. The heavier material discharges through the central openings, F, as previously described.

The material to be treated is delivered into the hopper N by a feed-screw, X, turning within a cylinder, which receives the material from a hopper, Y. The feed-screw is turned by a clutch mechanism, Z, which is operated by a crank and connecting-rod, *a*, from the driving-shaft. This clutch may be an ordinary pawl and ratchet, as shown in the drawings; but other forms of clutches may be used, if desired.

In order to regulate the stroke of the piston to suit the different qualities of material to be treated, the upper cam or disk, V, is raised or lowered and the stroke shortened, as follows: Grooved lugs *m* are fixed to the top of the cam, and the grooves fit over the edges of a spiral or auger-shaped disk, *n*, which is fixed to the top of the frame U. When the cam V is turned in one direction it is raised, and when turned in the opposite direction it is lowered. Set-screws *o* pass through the grooved lugs and are turned to bind against the edge of the spiral disk, so as to hold the cam at any desired point. The action of this cam V upon the lower and movable one, T, causes the latter to be depressed, carrying with it the shaft K and the piston C, and when released the spring W draws them up with a sudden motion, as before described.

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

1. The concentric cylinders A B and the stationary foraminous annular ore-bed E, situated between them, in combination with the annular piston C, provided with valves, and means, substantially as described, for imparting a vertically-reciprocating movement to said piston and forcing air up through the ore-bed.

2. In a dry-ore separator, the combination of concentric cylinders A B, an annular reciprocating piston interposed between said cylinders, an annular ore-bed having discharge-openings, and the flange G, extending below the level of such openings.

3. The combination of the concentric cylinders A B, the stationary annular ore-bed, the reciprocating piston C, the flange G, the revolving hopper N, and the scrapers H.

4. The concentric cylinders A B and the stationary annular ore-bed E, in combination with the vertically-reciprocating piston C, having connecting-arms I, the rod or shaft K, and the cam disks and spring, substantially as described.

5. The concentric cylinders A B, the annular ore-bed, and the piston, in combination with the perforated rotary hopper N, the feed-hopper Y and screw X, and the clutch-mechanism Z, substantially as described.

6. The cylinders A B, the annular ore-bed E, having openings for the discharge of the material, and the hopper discharging upon said ore-bed, in combination with a reciprocating piston, a central shaft, cams, and spring, and the adjusting device *m n* for changing the length of the stroke, substantially as described.

In witness whereof I hereunto set my hand.

MILES B. DODGE.

Witnesses:
S. H. NOURSE,
JOHN E. HAMILL.