No. 676,041. Patented June 11, 1901.

C. H. LANE.

AIR SEPARATOR.

(Application filed Feb. 23, 1900.)

(No Model.)

Fig. 1.

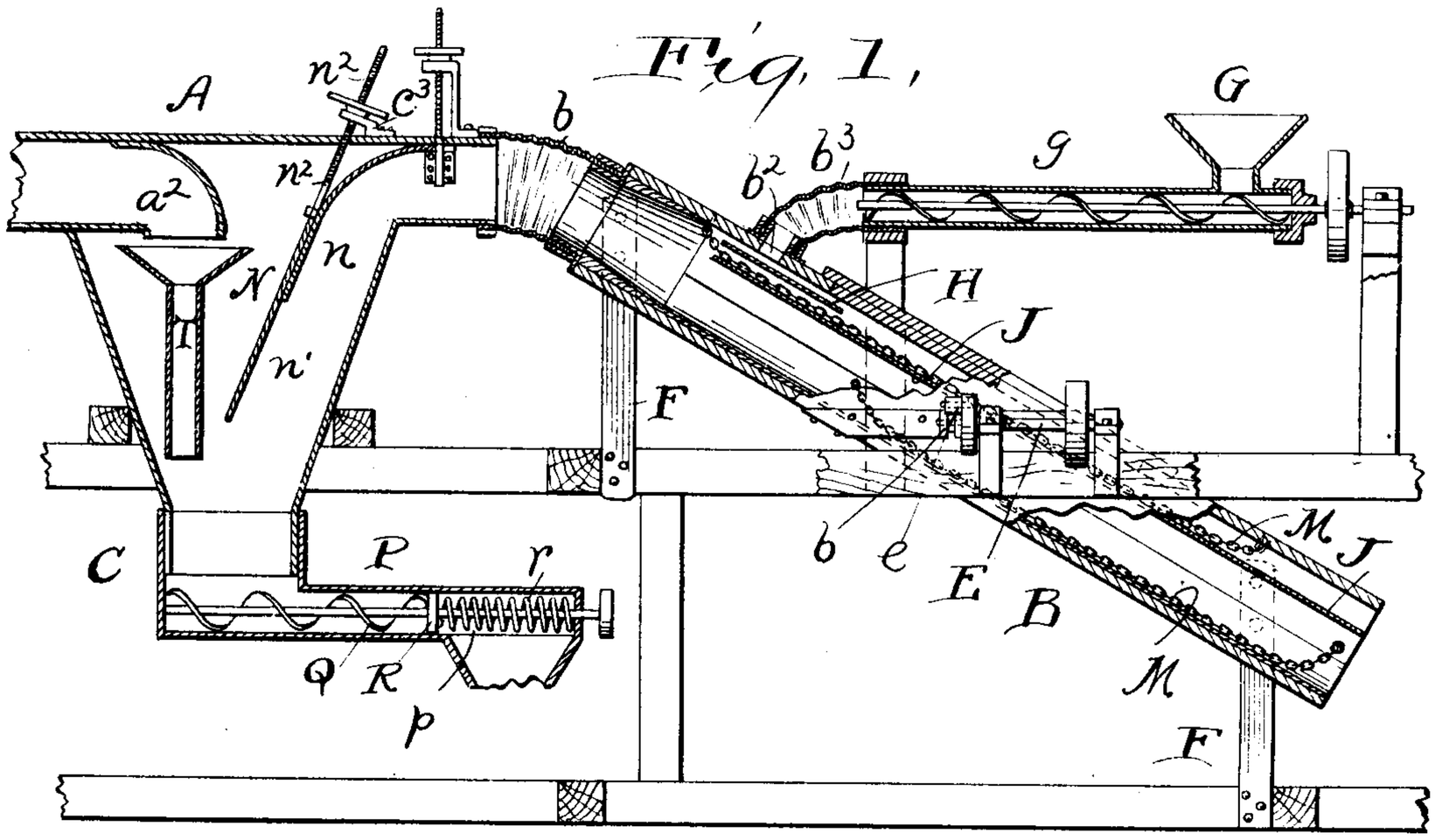


Fig. 2.

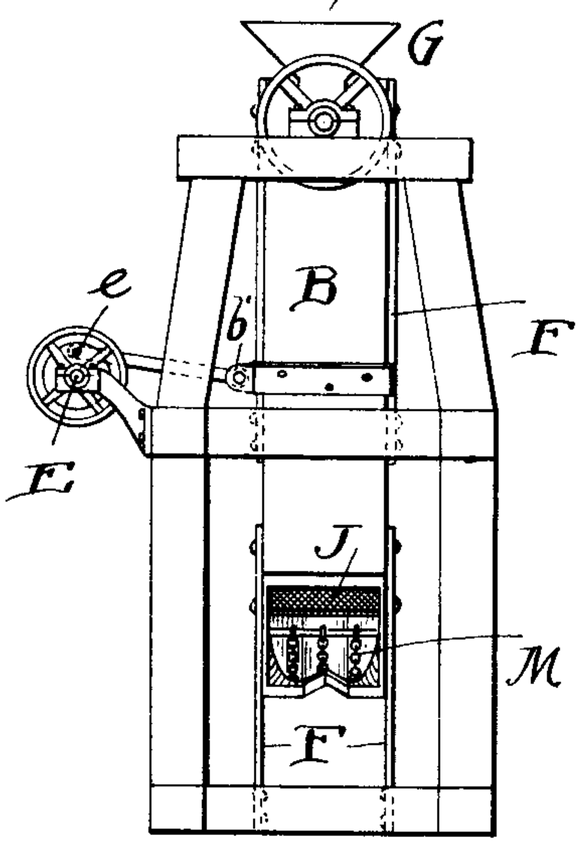
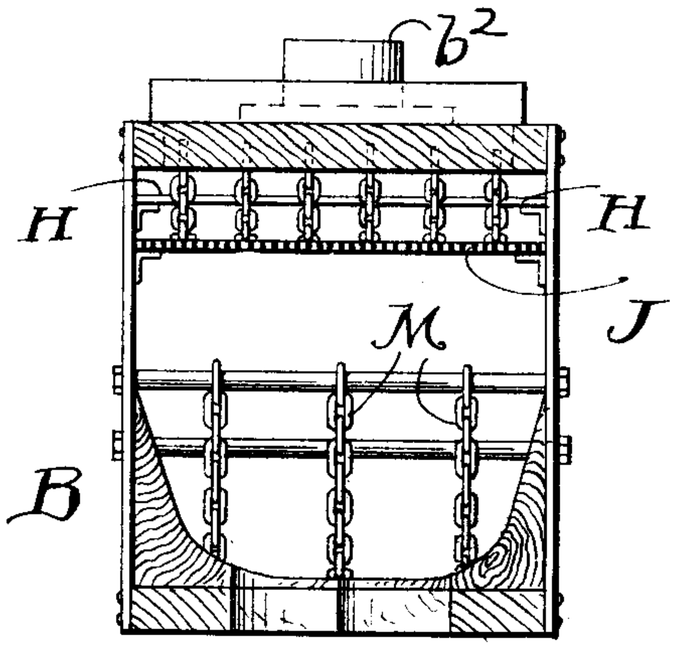


Fig. 3.



Witnesses
E. B. Gilchrist
H. M. Wise.

Inventor,
Charles H. Lane,
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

CHARLES H. LANE, OF CLEVELAND, OHIO.

AIR-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 676,041, dated June 11, 1901.

Application filed February 23, 1900. Serial No. 6,178. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. LANE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Air-Separators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of the invention is to segregate the lighter from the heavier particles in a pulverized mass.

The apparatus embodying my invention is capable of use for separating the middlings from the mass obtained by pulverizing wheat-berries, for separating the mineral from the non-mineral particles in ore, and for a variety of analogous uses which need not be here enumerated.

The invention consists in the construction and combination of parts hereinafter described, and pointed out definitely in the claims.

In the drawings, Figure 1 is a sectional side elevation of an apparatus embodying my invention. Fig. 2 is an end view from the right of Fig. 1. Fig. 3 is an enlarged right-end view of the tube B.

Referring to the parts by letters, A represents a pipe the delivery end of which is to be connected with a suction-fan, which is not shown. The inlet end of pipe A is connected by a flexible tubular connection *b* with an inclined tube B, whose lower end is open for the admission of an air-current. One or more settling-chambers C are connected into and they extend below this pipe A. The tube B is supported by suitable flexible supports F, which permit its lateral oscillation. A connecting-rod connects ears b' on the side of this tube with a crank-pin *e*, carried by a rotating shaft E. By the rotation of this shaft and through the mechanism described the inclined tube B is oscillated with greater or less rapidity laterally. As stated, the lower end of this tube B is open, and consequently as air is drawn out of the pipe A it is drawn into the lower end of the tube B, thereby creating an upward current in said tube. It will be noticed that the lower part of the sides of this tube are beveled or inclined inward. If the tube were square at the bottom, the air-current in the corners would be "dead;" but by the formation described this is prevented. The current is strong in all parts of the tube, and the material falling upon these beveled sides is guided inward and will be subjected to the full force of the said air-current, with the results stated herein. The pulverized material which is to be operated upon is slowly delivered into this tube near its upper end through a suitable opening b^2 in its top side. The material may be carried to this opening from a hopper G through a tube *g* by means of a screw conveyer g', and this tube *g* may be connected with an inlet-opening b^2 by a flexible tube b^3, which will maintain the connection while the tube B is oscillating. In the tube B, but below the inlet-opening b^2, is a short transverse plate H, onto which the material falls. Below this plate is a transverse screen J, the lower end of which extends to the lower end of the said tube. The pulverized material, therefore, as it enters the tube B falls upon the plate H and thence to the screen J. The oscillation of this tube B causes the material to be sifted through the screen into the upward current of air in the tube. This air-current will take up the finer and lighter particles of this material and will carry them upward into the pipe A and through such settling-chambers C as are connected in it. The particles which are too large to go through the screen will tail over its lower end, and all of the material which is not carried away by the air-current will as the tube is oscillated be caused to flow down to the lower end of the tube, whether such particles are on the plate H, screen J, or bottom of the tube.

Upon the screen J and upon the bottom of the tube and extending lengthwise thereof are secured a plurality of loose chains M, the ends of which are secured above the surfaces upon which they rest. As the tube oscillates these chains will move laterally upon the screen and bottom of the tube in contact with the pulverized mass which is sliding down them and will have the effect of thoroughly separating and breaking up the lumps which may have been formed by the matting or sticking together of the pulverized particles, and before the mass reaches the lower end of the screen or of the lowest plate F the individual particles will be thoroughly separated

from one another and those which are light enough to be carried away by the air-currents will be so carried away, while the heavier particles will, as before stated, be delivered out of the lower end of said tube.

It is a practical impossibility to regulate the force of the air-current so that it will be sure to carry away substantially all of the light particles, composed, for example, of the rock-dust only in the case of pulverized ore, without at the same time carrying away some of the very fine particles of the pulverized metal. It is of course desirable that this material shall be recovered, and substantially all of it which is carried off by the air-current will be recovered in the settling chamber or chambers C.

A transverse partition N is secured across the settling-chamber, between the inlet and outlet openings thereof. This partition may be adjustable in length, the lower part n' of it being adapted to slide upon the upper part n through the instrumentality of a stem n^2, which passes out of the top of the settling-chamber, said stem passing through a bracket c^2, and a nut which screws upon said stem and engages with the bracket. The air-currents carrying the pulverized particles necessarily dive under this partition, and much of the heavier particles will settle out of the current to the bottom of said settling-chamber.

A part of the pipe A which is connected with the outlet-opening of the settling-chamber extends into said chamber and is turned down substantially as shown. Beneath this downturned end a^2 of said pipe is a funnel T, which extends downward nearly to the bottom of the settling-chamber. The air-current carrying the light particles in suspension must after it enters this settling-chamber and dives under the partition pass over the top of the funnel before it can enter the downturned end of said pipe-section a. Some of the heavier particles of the material will fall out of the air-current into this funnel and be delivered out of its lower end into the settling-chamber, but below the effective force of the air-current.

By means of the construction described substantially all of the heavier parts of the fine material (which has been carried out of the tube B by the air-current) which contains any of the metal will settle in this settling-chamber or in a duplicate of it, which may be also connected in the pipe A nearer to the fan.

A substantially horizontal tube P is secured to the lower end of the settling-chamber in communication therewith, whereby the settled material will fall into this tube. A rotating screw conveyer Q in this tube acts to draw the material along the same and to discharge it through an opening p in the bottom of said tube. In the tube is a transverse valve-plate R, which is normally held by a spring r in position between the outlet-opening p and the rear end of the screw conveyer, whereby it prevents the air from being drawn into the settling-chamber through this tube. When the settled particles have sufficiently accumulated in the tube, the screw conveyer carrying them rearward presses them against this valve and moves it rearward, so that the opening p is uncovered and said material may fall through it.

Having described my invention, I claim—

1. In an air-separator, in combination, an inclined rectangular tube, a screen carried longitudinally therein, means for feeding material thereupon, chains adapted to lie thereupon, means for vibrating said tube, means for forcing an air-current through said tube longitudinally, and a false bottom in said tube filling in the lower corners thereof, substantially as described.

2. In an air-separator, the combination of a pipe adapted for connection at its outlet end with a suction-fan, a settling-chamber connected in and hanging below said pipe, a part of the pipe which is connected with the outlet-opening of said settling-chamber being extended into the settling-chamber and turned downward, a funnel arranged below the downturned end of said pipe-section, and a transverse partition in said settling-chamber between the inlet-opening thereof and the downturned end of said pipe, with an inclined tube, open at its lower end, and having an inlet-opening in its top side, a transverse screen in said tube below said inlet-opening, a flexible tube connecting the upper end of said tube with the pipe first named, and means for oscillating said tube laterally, substantially as and for the purpose specified.

3. In an air-separator, in combination, an inclined tube, a screen carried longitudinally therein, means for feeding the untreated material upon the upper end of said screen, chains having their ends fastened in said tube and hanging loosely longitudinally upon said screen, means for vibrating said tube, means for producing an air-current through said tube, said tube having a rectangular outer section, and a supplementary bottom carried within said tube and filling out the corners thereof whereby the force of said air-current is substantially equalized throughout any cross-section thereof, substantially as described.

4. In an air-separator, in combination, a settling-chamber having near its top an inlet and an outlet opening, a funnel suspended within said chamber with its flaring mouth upward, and an outlet-pipe projecting through the outlet-opening into the chamber and having its intake-opening directly over said funnel, substantially as specified.

5. In an air-separator, in combination, a settling-chamber having near its top an inlet and an outlet opening, a funnel suspended within said chamber with its flaring mouth upward, an outlet-pipe projecting through the outlet-opening into the chamber and having its intake-opening directly over said fun-

nel, and a baffle-partition extending down from the top of the chamber and placed between the inlet-opening therein and said funnel, substantially as specified.

6. In an air-separator, in combination, a settling-chamber having an outlet through which the air must enter in a vertical direction, a funnel-shaped tube suspended therebeneath, a baffle-partition projecting so as to deflect the incoming air downwardly toward the lower end of said funnel, and means for regulating the extent of projection of said partition, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CHARLES H. LANE.

Witnesses:
E. L. THURSTON,
ALBERT H. BATES.