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C. H. LANE.

PNEUMATIC SEPARATOR.

(Application filed Feb. 17, 1899.)

(No Model.)

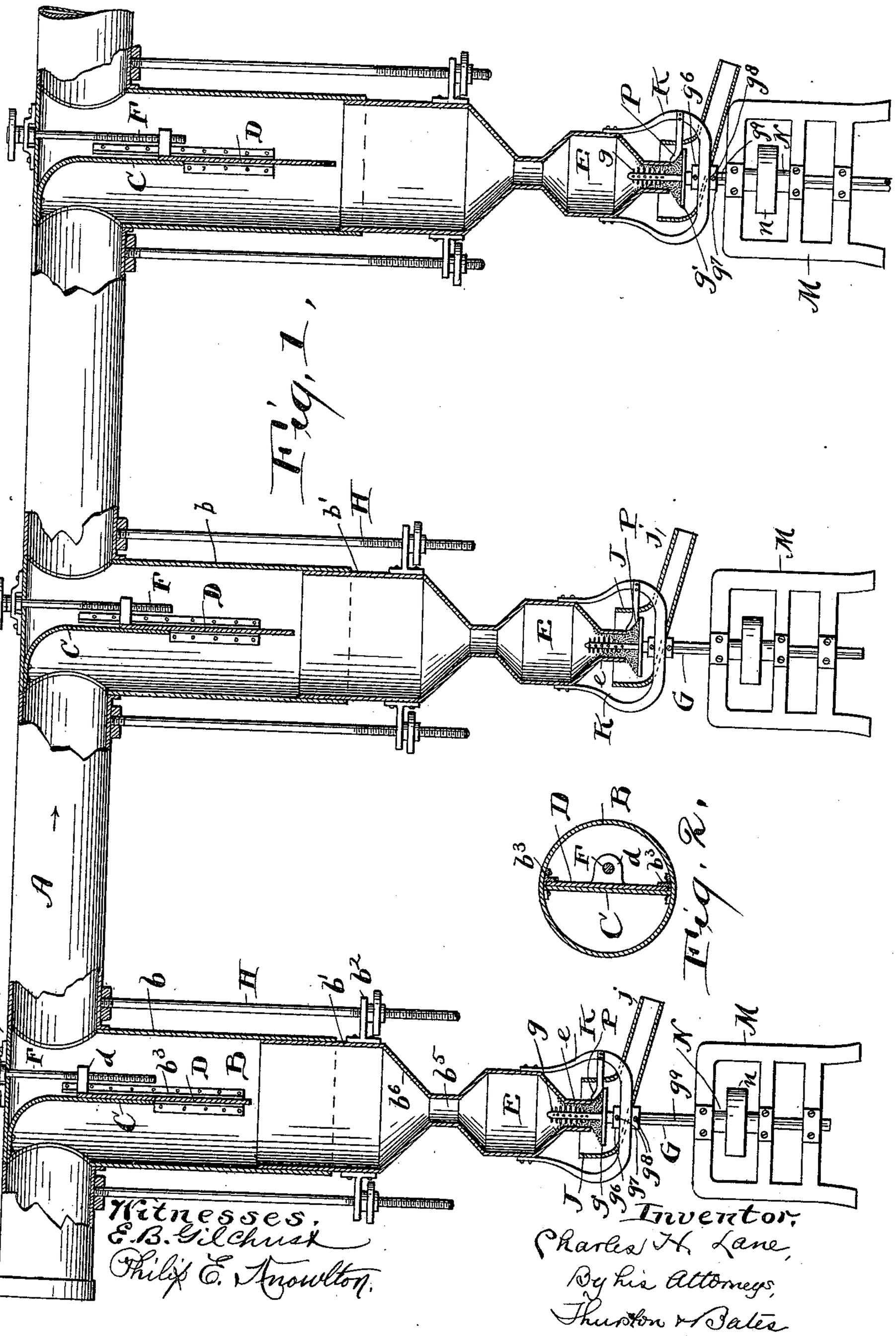

Fig. 1.

Fig. 2.

Witnesses,
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UNITED STATES PATENT OFFICE.

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PNEUMATIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 645,962, dated March 27, 1900.

Application filed February 17, 1899. Serial No. 705,804. (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 Pneumatic 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 provide a cheap and simple device which is capable of being used successfully to separate the heavier from the lighter particles in a pulverized mass and to grade the particles so separated according to their weight, which is in most cases according to their size as well. It is capable of use for segregating and grading middlings in the mass obtained by pulverizing wheat-berries, in segregating and grading the mineral from the non-mineral particles in pulverized ore, for concentrating crushed ore, and for a variety of analogous uses which need not be here enumerated.

The invention relates to the construction and combination of parts whereby the device is capable of effecting the results stated, and particularly for effecting such results under various conditions as to the force of the air-current and the actual and relative weight of the particles to be segregated and those with which said particles are mixed, all of which will be pointed out definitely in the claims.

In the drawings, Figure 1 is a side elevation, partly in section, of my improved separator; and Fig. 2 is a horizontal sectional view through one of the settling-chambers.

Referring to the parts by letters, A represents a substantially-horizontal pipe which the pulverized material may pass through by pneumatic means. Preferably the air is sucked through this pipe in the direction indicated by the arrow by an exhaust-fan, and the air carries with it the pulverized material, which is fed into the end of said pipe opposite to that to which the exhaust-fan is attached. The means for feeding the material into pipe A and the exhaust-fan or other means for causing the necessary flow of air through said pipe are not parts of my invention, and consequently they are not shown.

At suitable intervals the settling-chambers B, of which any number may be used, are connected with the pipe A, from which they depend in a substantially-vertical direction. These chambers each consist of a pipe b, which is secured to pipe A, in open communication with it, and a telescoping lower section b', which forms the lower end of the chamber. This lower section is supported and is adjustable vertically up and down, so as to shorten or lengthen the settling-chamber, by means of the vertical rods H, which are secured to pipe A and pass through ears b^2, secured to the sides of the section b', and the nuts, which screw on the lower ends of said rods below said ears.

Transverse intercepting-partitions C are secured across the pipe A, and they extend down a considerable distance into the settling-chamber B. These partitions may be made of sheet metal and preferably present at their upper ends a concave surface toward the incoming air-current. These partitions present a barrier to the straight course of the air laden with pulverized material, wherefore said air and material must dive down into the settling-chamber under said partitions.

D D represent gates, one of which is placed in each settling-chamber. It extends entirely across the settling-chamber, close to and as near as may be in line with the partition C. It is vertically movable between guides b^3 b^3, secured to the sides of the settling-chamber, and may be moved up and down by means of a screw F, which passes through the top of the pipe A and screws through an ear d, secured to said gate. A collar or flange f' is secured to the screw F, and it lies between the top of the pipe A and a yoke a', secured thereto, whereby endwise motion of said screw is prevented. A hand-wheel f^2 is secured to the upper end of this screw. Through the described mechanism this gate may be moved down to form a substantial prolongation of the intercepting-partition C.

In a machine adapted for practical use there is a very great advantage in being able to increase the length of these intercepting-partitions and to correspondingly lengthen the settling-chambers, because the partitions should be longer as the particles constituting the mass are lighter or as the air-current is stronger. One cannot tell in advance what should be the length of these partitions nor

of the settling-chambers to produce the desired segregation and grading with any material under the varying conditions which may arise in the practical operation of the machine. This can only be discovered by watching the results and adjusting the parts of the mechanism accordingly. For example, the direction and force of the wind may affect the force of the air-current induced by the fan, and thus an adjustment of the machine which produces satisfactory results with a given material to-day may fail to-morrow. So also different materials require different adjustment. The operator must watch the results. If too small an amount of the particles settle, the partitions and chambers should be lengthened. If the settled material is found to contain particles which ought not to settle, the partitions and chambers should be shortened.

It will be noticed in the drawings that the intercepting-partition is made longest in that settling-chamber which is nearest to the exhaust-fan, at which point, of course, the draft is strongest. It will also be noticed that that settling-chamber which is nearest the fan is most elongated, this being the condition under which generally the most satisfactory results can be obtained.

The lower section of the settling-chamber is conical at its lower end and has a comparatively-small opening or neck b^5, through which the settled particles are guided by the inclined walls b^6. The settled particles fall through the neck, preferably into what may be called the "discharge-chamber" E, which is secured to the lower section of said settling-chamber and being in open communication therewith may be considered as a part of said chamber. The lower end of this discharge-chamber is likewise made conical and has at its lower end a comparatively-small cylindrical neck e, through which the settled particles are discharged into a suitable hopper J, having an inclined discharge-pipe j. A vertical shaft G projects into the neck e and has secured to it a plurality of agitator-arms g, which, as the shaft rotates, prevents the packing of the settled material and facilitates its discharge from the discharge-chamber. A disk g' is secured to the shaft G a short distance only below the lower end of said neck. The settled particles as they fall out of the neck fall on this disk and bank up substantially as shown. These particles will always accumulate upon this disk in sufficient quantity to serve as a seal for the discharge-opening and prevent air from being drawn through the same into the settling-chamber. This shaft may be rotated by any suitable means; but inasmuch as the discharge-chamber is vertically movable with the lower section of the settling-chamber it is desirable that the shaft shall move with it, so that when the disk g' has been placed in proper relation to the lower end of the neck e its position will not be changed by the adjustment of the section b' of the settling-chamber. A yoke K is therefore secured to the discharge-chamber, and the shaft G passes through it. Collars g^6 g^7 are secured to the shaft on both sides of the yoke by means of set-screws g^8, and they by their engagement with said yoke prevent any endwise movement of the shaft with reference to the discharge-chamber. These collars may, however, be fixed to various parts of the shaft, which permits the shaft to be adjusted up and down with reference to the discharge-chamber, so that the disk may be secured in proper relation thereto. A suitable frame M, which may rest upon a floor, furnishes the bearings for a vertical tubular shaft N, to which a driving-pulley n is secured. The shaft G, which has a tongue g^9, passes through this tubular shaft, and the said tongue engages with an internal groove in the tubular shaft, whereby the rotation of the shaft N causes the rotation of the shaft G, but permits said shaft G to move vertically through shaft N, as desired.

A wiper P may be secured to the yoke and serve to wipe the settled particles off the disk and into the hopper J.

Having described my invention, I claim—

1. In a pneumatic separator, the combination of a substantially-horizontal suction-pipe, and a substantially-vertical settling-chamber connected in and hanging below said pipe and consisting of an upper section and a lower section which telescopes onto the upper section, with a dividing-partition which extends transversely across the pipe and the upper part of the settling-chamber, and means for vertically adjusting said lower section, substantially as and for the purpose specified.

2. In a pneumatic separator, the combination of a substantially-horizontal suction-pipe, and a settling-chamber connected in and hanging below said pipe, and consisting of an upper section and a lower section which telescopes onto the upper section, means for vertically adjusting said lower section, a transverse dividing-partition across said pipe, and the upper section of said settling-chamber, and a vertically-adjustable gate in the upper section which is adapted to serve as a downward extension of said partition, substantially as and for the purpose specified.

3. In a pneumatic separator, the combination of a suction-pipe, a settling-chamber consisting of the upper section b which depends from and is in open communication with said pipe, a lower section b', and means for adjusting the same vertically, said section having a contracted neck, a discharge-chamber secured to and in communication with said neck, which discharge-chamber has a cylindrical contracted discharge-neck, and means for controlling the flow of the settled particles through said neck, a yoke secured to said discharge-chamber, a vertical shaft passing through said yoke and into the neck of the discharge-chamber, a disk secured to said shaft below said neck, collars secured to the

shaft above and below the yoke and a tubular vertical driving-shaft through which the shaft first named passes and with which it has a tongue-and-grooved connection, substantially as and for the purpose specified.

4. In a pneumatic separator, the combination of a suction-pipe, a settling-chamber which is connected in said pipe and hangs below the same, a transverse intercepting-partition extending across said pipe and down into said settling-chamber, said partition presenting a concave surface at its upper end toward the inlet of said pipe, and a lower section of said settling-chamber which telescopes with the upper section and is vertically adjustable with respect thereto, said lower section having a contracted discharge-opening at its lower end, and means for closing said opening to prevent the ingress of air, substantially as and for the purpose specified.

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

CHARLES H. LANE.

Witnesses:
E. L. THURSTON,
PHILIP E. KNOWLTON.