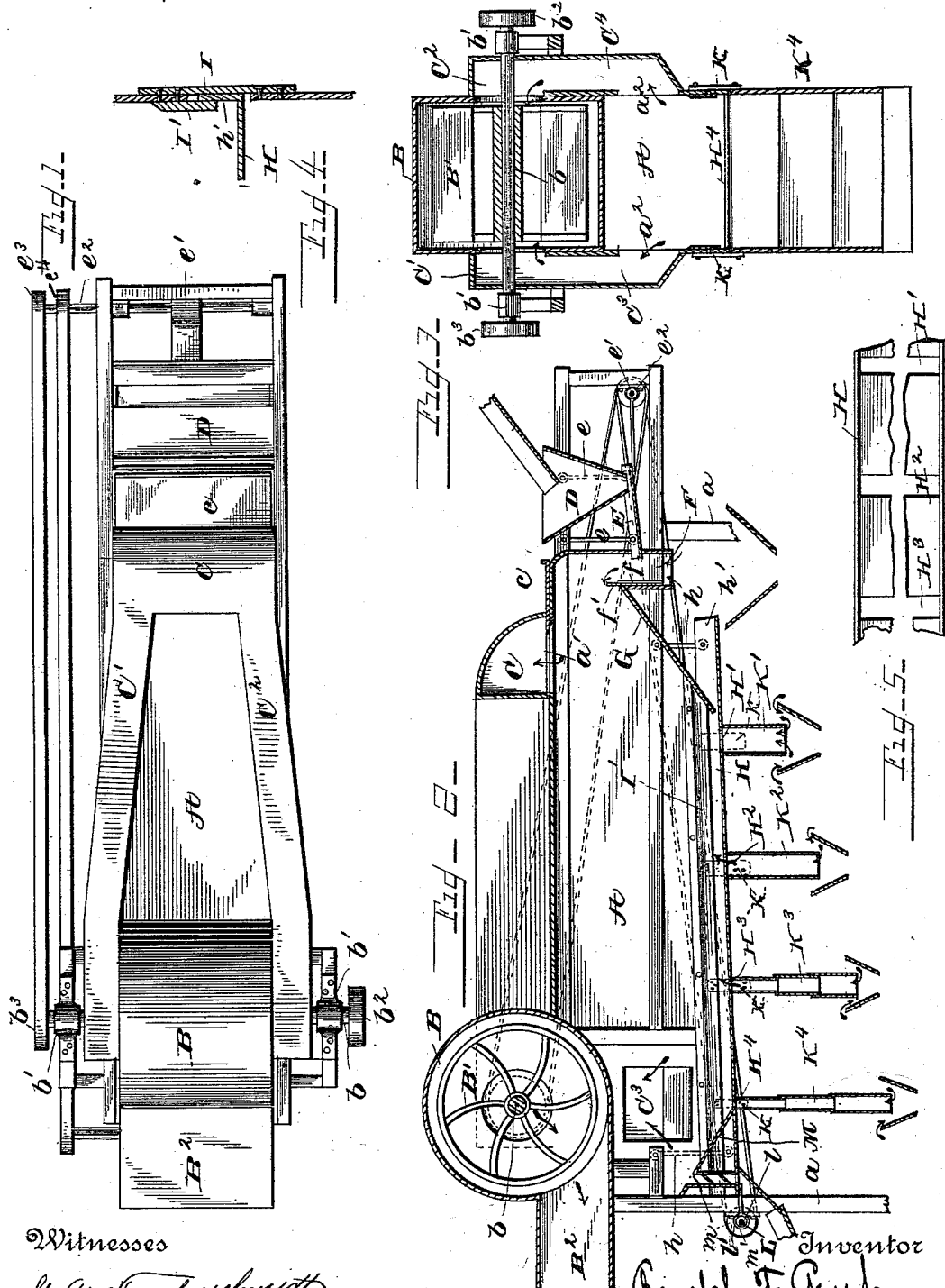


(No Model.)

J. F. GENT.
PNEUMATIC SEPARATOR AND GRADER.

No. 420,153.

Patented Jan. 28, 1890.



Witnesses

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JOSEPH F. GENT, OF COLUMBUS, INDIANA.

PNEUMATIC SEPARATOR AND GRADER.

SPECIFICATION forming part of Letters Patent No. 420,153, dated January 28, 1890.

Application filed July 8, 1889. Serial No. 316,846. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH F. GENT, a citizen of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented certain new and useful Improvements in Pneumatic Separators and Graders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to pneumatic separators and graders for finely-divided materials; and it consists in certain improved features of construction and combination, whereby said materials are exposed to the action of a current of air and the lighter parts removed, said lighter parts being subsequently treated successively and progressively by air-currents which diminish in volume, whereby the material is separated into different grades, if desired.

My invention is illustrated in the accompanying drawings, and is fully disclosed in the following specification and claims.

In the said drawings, Figure 1 represents a top plan view of my improved apparatus. Fig. 2 is a central vertical longitudinal section of the same. Fig. 3 is a vertical transverse section of the said apparatus, and Figs. 4 and 5 are detail views of parts of the same.

In the drawings, A represents the main frame of the apparatus, which is of rectangular form, and is supported by suitable standards or supports *a*. At the rear part of this frame is secured a casing B, in which is located a fan, blower, or other air-forcing device B', of any preferred construction. The fan or blower is mounted on a shaft *b*, which rotates in bearings *b'*, secured by means of suitable supports or brackets to the main frame. A band-pulley *b*² is rigidly mounted on the fan-shaft *b* and receives the driving-belt, and a similar pulley *b*³ is secured to the opposite extremity of the shaft *b*.

A hood C is located upon the main frame A, adjacent to the front of the same, and communicates with the interior of the same at *c*. Two hollow tubes C' C² extend rearwardly from said hood and communicate with the casing B of the fan, and similar tubes C³ C⁴ extend from the casing B downwardly to and

communicate with the main body at *a*², as shown in Figs. 2 and 3. It will thus be seen that when the fan is in operation there will be a strong suction from the main body through the aperture *a'*, hood C, and tubes C' C², and another suction from the main body through apertures *a*² and tubes C³ C⁴, as indicated by arrows in Figs. 2 and 3.

A sliding valve *c* is suitably arranged to regulate the amount of air drawn through the aperture *a'* into the hood C and tubes C' C², and the apertures *a*² *a*² are also preferably provided with similar sliding valves.

Adjacent to the front of the machine is mounted the hopper D, beneath which is a shaker or shaking-table E. This shaker is suspended from the main frame by means of links *e*, and is reciprocated by an eccentric *e'* on a shaft *e*², provided with a band-wheel *e*³, which receives a belt from the band-wheel *b*³.

An air-inlet port F is located adjacent to the discharge end of the shaker E and extends, preferably, entirely across the machine. This inlet-port is so located with respect to the shaker that the material introduced into the machine through the hopper D will be discharged by the shaker into the suction-port F, and there be subjected to the suction-blast passing through said port. As a result, the lighter products—such as dust, chaff, and the more finely-divided portions of the material—will be drawn up by the blast and carried toward the aperture *a'* of the main body, while the heavy particles, freed from all impurities, will fall through the port F and into a hopper or other receptacle provided beneath the same. Of the lighter products drawn up by the blast the lightest, consisting of very minute particles of dust and other refuse material, will be carried directly by the blast through hood C and the tubes C' C² to the fan and discharged through the exhaust-port B² of the fan-casing at the rear of the machine. The heavier parts of the product carried over by the blast will fall upon a slide or chute G, secured in the main body and extending downward in an inclined direction from one of the walls of the inlet-port F.

The side *f* of the inlet-port adjacent to the chute or slide G is provided with an extension or slide *f'*, which is capable of being drawn up and secured in any desired posi-

tion by any preferred means. This extension or slide f' acts to regulate the amount of material carried over the same by the blast, as the higher it is raised the more material will be prevented from passing over, and will therefore fall through the inlet-port.

Beneath the inclined chute G is located an inclined shaker H, which is preferably of considerable extent, and is provided with a series of slots H' H^2 H^3 H^4 , &c., extending across the same. This shaker is supported by links h , and is provided with side pieces h' , which occupy recesses in the walls of the main body A of the machine. In Figs. 3 and 4 I have shown these recesses formed by cutting away the walls of the main body and attaching a strip I to the outside of the edges of the same; but they may be formed in any other suitable manner.

Upon the inner face of the main frame strips I' are secured, which overlap the side pieces h' of the shaker H, and the upper edges of these strips are preferably given a downward bevel, so that all material falling upon the same will be conducted upon the shaker below. These strips I' will act as valves to prevent air from being drawn in at the sides of the shaker H.

The slots H' H^2 , &c., are preferably graduated and decrease in size from the inclined chute G toward the rear of the machine, and beneath each slot is located an inlet-port K' K^2 K^3 K^4 , &c., which are rigidly secured to the main frame by the brackets or hangers K. These inlet-ports are also graduated, and each is slightly wider than its respective slot, the largest of said ports being preferably smaller than the port F.

The shaker H is reciprocated by means of an eccentric l on a shaft L, which is mounted in suitable bearings, and is provided with a band-wheel l' , which receives motion from the shaft e^2 by means of a belt passing over said band-wheel and a similar pulley e^4 on the shaft e^3 .

The supplementary inlet-ports K' K^2 , &c., are, as stated, graduated as to width, and they also increase in length toward the rear of the machine, in order that the blasts may become progressively of decreasing volume. I prefer, however, to construct a number or all of said ports in such manner that they may be shortened or lengthened at will, and this I accomplish in this instance by the telescoping construction shown in the drawings. The telescoping parts are fitted to slide one upon the other, and may be secured at any point by means of pins engaging suitable apertures, or in any other manner.

At the rear end of the shaker H is a table M, inclined oppositely to the chute G, and provided with a slot m , extending across the same. This slot forms the upper part or mouth of an outlet-passage N, provided with two valves n n , located at an incline in said passage, extending the full width of the same and pivotally secured to the wall of said pas-

sage at their upper edges. Beneath the passage N is a chute for conducting away any material falling upon the same. A suitable chute is preferably located beneath each of the inlet-ports K' K^2 , &c., to receive any material falling through the same, and these chutes may be connected with suitable receptacles; or I may provide one chute to receive all material from all the ports K' K^2 , &c., or conduct material from all the smaller chutes to one receptacle, if found desirable. I may employ any desired number of inlet-ports K' K^2 , &c., as found most effective or desirable.

The operation of the device is as follows: The fan and shakers E and H are set in motion by means of the mechanism hereinbefore described, and the comminuted material to be acted upon is admitted to the machine through the hopper D. The material falls upon the shaker E, and, said shaker being inclined, it will be fed gradually to the inlet-port F, where the initial blast will allow the heavier portions, thoroughly cleaned, to fall upon the chute below and cause the lighter portions to pass over the side f of the inlet-port into the main body of the machine. Here the lightest portions—such as dust, &c.—will be carried to the fan with the air-current and be discharged from the exhaust-port B^2 of the casing B. Of the remaining portion of the refuse material the heaviest will fall upon the inclined slide G and be conducted to the inclined shaker H, where most of said material will find its way eventually; but the lighter parts may be carried over so far as to fall upon the shaker itself. Here the material is treated successively and progressively by currents of air constantly decreasing in volume and the material separated into grades and the refuse left from the last operation discharged from the machine. The material will be fed by the shaker to the nearest slot H' H^2 , &c., and acted upon by the blast, which will allow some of the material to fall through onto the chute beneath and carry a portion over to the next slot, where it will be similarly treated, all of said blasts entering the main body at the said ports and being conducted to the fan or suction device through the apertures a^2 and tubes C^3 C^4 . The refuse left after the last blast has operated upon the material falls upon the inclined table M and finds its way into the discharge-passage N, where it falls upon the upper valve n . When a sufficient amount of material has accumulated upon the valve, which, together with the one beneath, it is held closed by the pressure of air from the outside of the machine or by suitable springs, the said valve will fall and deposit its load upon the outer valve and then close. The lower valve n will then open and discharge the material from the machine. In this manner only one valve remains open at a time, and no air can enter the machine and thereby decrease the efficiency of the blasts, as would otherwise occur. It will thus be seen that the material is treated by

the initial and supplementary air-currents successively and progressively, thoroughly cleaned, and separated into grades of different gravities, if desired; or, if it is not desired to use the machine as a grader, the chutes may all be connected with one receptacle, and the material will be thoroughly cleaned and purified.

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

1. A pneumatic separator and grader having an inlet for the material and a discharge-opening for lighter portions of the same, and having a series of graduated inlet-ports for the admission of air-blasts between said inlet and said discharge-opening, decreasing in size from said inlet, and an air-outlet, whereby the material is cleaned, graded, and partially discharged through the said ports before reaching the said discharge-opening, substantially as described.

2. A pneumatic separator and grader having an initial inlet-port and means for feeding the material to said port, supplemental inlet-ports, decreasing gradually in size, means for feeding the material to said ports successively, and an air-forcing device, substantially as described.

3. A pneumatic separator and grader provided with the initial inlet-port, having a shaker adjacent thereto, a shaker adapted

to receive lighter portions of the material, provided with openings gradually diminishing in size, graduated inlet-ports for said openings, and an air-suction device, substantially as described.

4. A pneumatic separator and grader having an inlet for the material and an outlet for the same, and having a series of openings of different sizes for admission of air-blasts between the inlet and outlet of the machine, and an air-outlet, whereby the material is cleaned, graded, and partially discharged through the blast-openings before reaching the outlet, substantially as described.

5. A pneumatic separator and grader having an inlet for the material and an outlet for the same, and having a series of graduated openings, decreasing in size from the inlet toward the outlet, located between the inlet and outlet, and an air-outlet, whereby the material is cleaned and graded and partially discharged through the blast-openings before reaching the outlet, substantially as described.

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

JOSEPH F. GENT.

Witnesses:

J. H. WHITAKER,
L. P. WHITAKER.