

(No Model.)

2 Sheets—Sheet 1.

H. A. & C. A. BARNARD.
DUST COLLECTOR.

No. 458,965.

Patented Sept. 1, 1891.

Fig. 1.

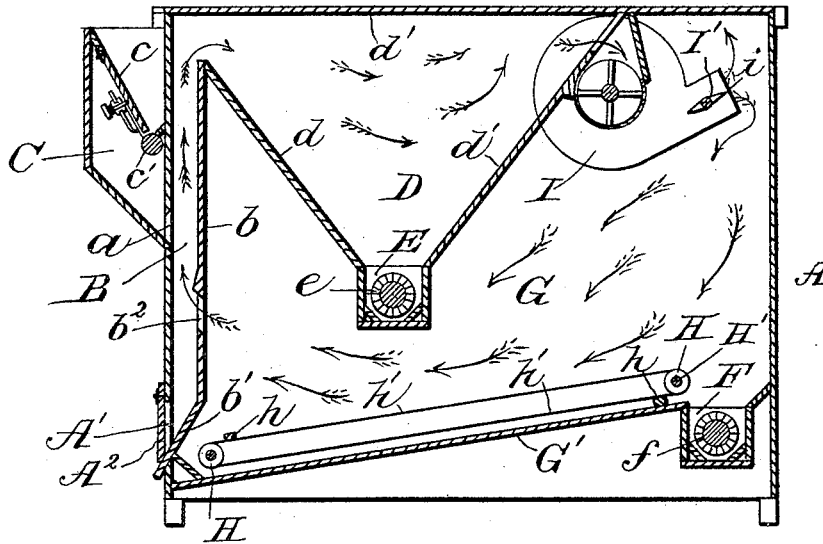
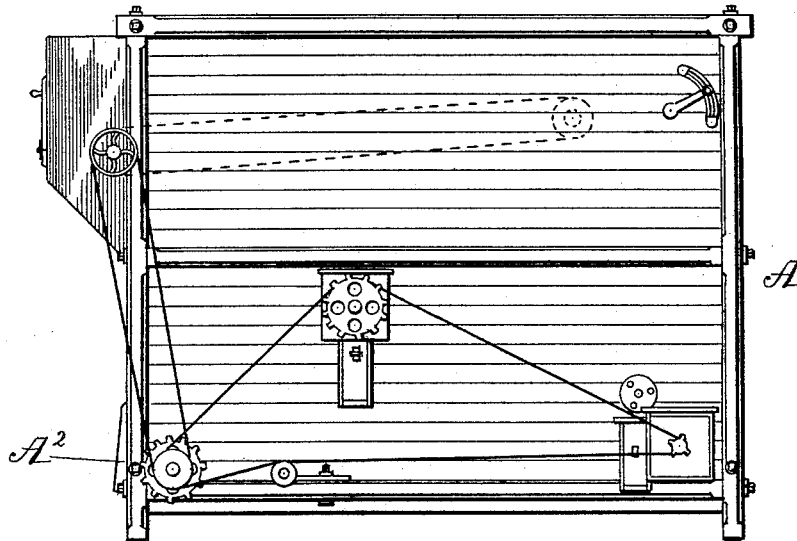


Fig. 2.



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Fig. 3.

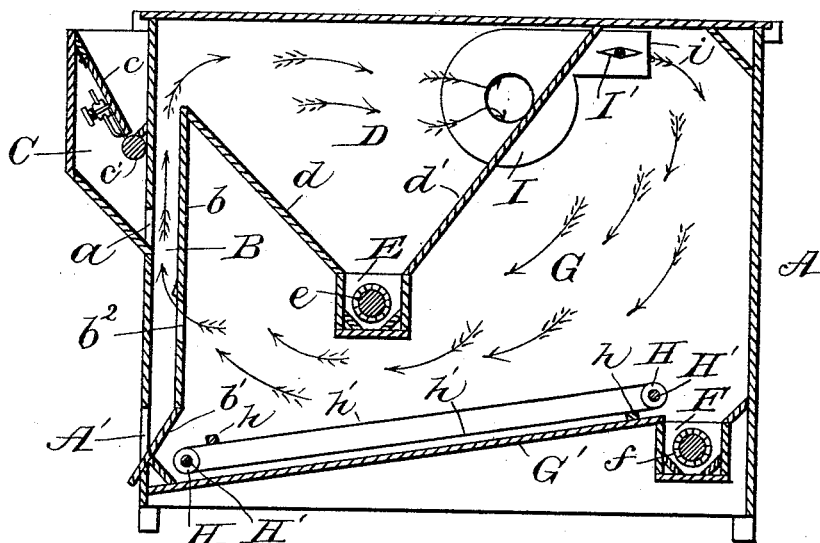
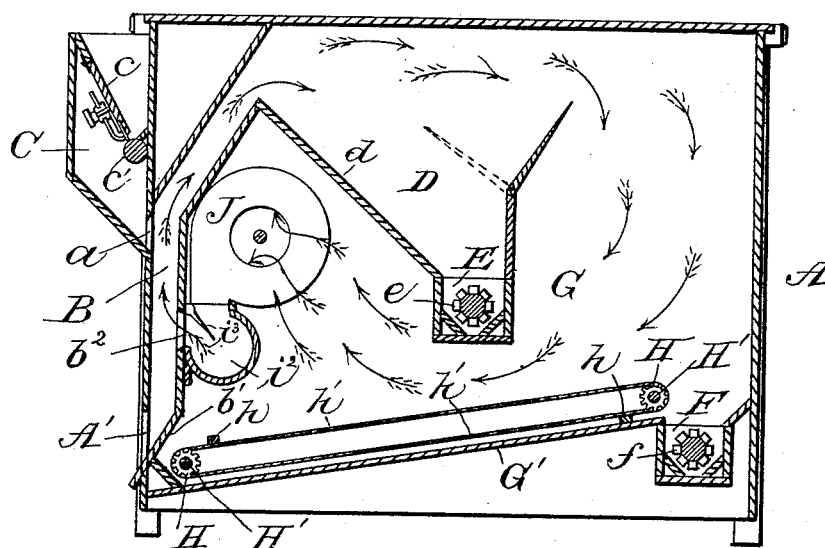


Fig. 4.



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UNITED STATES PATENT OFFICE.

HEMAN A. BARNARD AND CHARLES A. BARNARD, OF MOLINE, ILLINOIS,
ASSIGNORS TO THE BARNARD & LEAS MANUFACTURING COMPANY,
OF SAME PLACE.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 458,965, dated September 1, 1891.

Application filed May 5, 1891. Serial No. 391,643. (No model.)

To all whom it may concern:

Be it known that we, HEMAN A. BARNARD and CHARLES A. BARNARD, of Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful improvements in Combined Purifiers, Graders, and Dust-Collecting Machines; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a central vertical longitudinal section through our improved separator, grader, and dust-collector. Fig. 2 is a side elevation thereof. Figs. 3 and 4 are vertical longitudinal sections showing modified constructions of the machine.

This invention is an improvement in dust-collectors, graders, and purifiers; and its object is to provide an improved machine for cleaning grain, separating the middlings and dust therefrom, and collecting the dust by means of an endless closed air-circuit; and it consists, essentially, in providing a machine with a separating-trunk through which the material to be cleaned is passed and subjected to an air-blast and directly discharged from the machine, with a settlings or middlings collecting chamber in which the lighter grade of material is carried by the air-current and deposited and conveyed out of the machine, and with a dust-collecting chamber extending beside and beneath the settling-chamber, and in which the dust and light impurities are collected and eventually discharged, the said chambers communicating through the separating-trunk at one end and with each other directly or through a fan-casing at the other, so that the continuous closed air current or circuit may be maintained through the chambers and trunk without affecting the free escape of grain from the trunk, all of which will be hereinafter more particularly described and claimed.

Referring to the drawings by letters, A designates the casing of the mill, the side walls of which are preferably perpendicular, and it is closed on all sides and top and bottom. Within this casing, near one end thereof, is a

transverse vertical partition *b*, the space between which and the adjoining end of the casing forms an air-trunk B. As shown in Fig. 1, this air-trunk is closed near the bottom of the casing by an inclined board *b'*, which extends through an opening *A'* in the end wall of the casing, said opening having a suitable flap-valve *A*² attached thereto, so that material falling into the trunk can pass out of the casing; but the valve will largely prevent ingress of air therein.

C designates a hopper attached to the end of the casing adjoining trunk B and communicating with said trunk through an opening *a* in the wall of the casing above opening *A'*. This hopper is provided with a regulating valve or valves *c* and a feed-roller *c'*, by which the material can be fed evenly into the trunk and also free entrance or inflow of air prevented.

Adjoining trunk B and to the inside thereof is a collecting-chamber D, which is formed by means of two transverse partitions *d d'*, which converge at bottom and are connected to a transverse trough E, in which is a conveyor *e*, adapted to carry out of the casing any material deposited in said trough. The inclined partitions *d d'* direct any material falling thereon into the trough. The remaining space within the interior of the casing forms a large dust-settling chamber G, which extends beneath the chamber D and to and beneath trunk B. Chamber D communicates with the upper end of trunk B at one end and at the opposite end with chamber G near the top of the machine, and chamber G communicates with trunk B through an opening *b*² in partition *b*, which opening is below the feed-opening *a*.

A fan is mounted in the casing in a suitable position to cause a blast or current of air to circulate endlessly during the rotation of the fan through chambers D G and trunk B, as indicated by the arrows, this air-circuit being entirely closed or maintained only in the casing. This current passes upwardly through trunk B, so that as grain or other material is fed therein from hopper C it is subjected to a blast of air and light impurities and dust therein taken up and over into

chamber D. The trunk B being much smaller in diameter than either of the chambers, the air-current is more forcible therein, and as the blast passes into chamber D it expands, and consequently the lighter grade of material falls into chamber D, as the air-blast is not sufficiently strong to carry it there-through, while the dust is sucked on into chamber G, where the current is still further weakened, owing to the greater size of said chamber. The bottom G' of chamber G may be flat, but is preferably inclined slightly upwardly from the end beneath trunk B to the opposite end of the casing, where it rests on a trough F, in which is a conveyer *f*, adapted to convey the dust out of the machine.

The bottom G' is preferably cleared by means of scrapers or brushes *h h*, mounted on endless belts *h' h'*, running over pulleys H on transverse shafts H', journaled in the sides of the casing, by which means the dust collected on bottom G' is swept into trough F and then carried out of the casing by conveyer *f*. The force of the air-current may be regulated by a suitable valve or valves located at one or more of the openings between the trunk-chambers or fan-casing.

In Fig. 1 the fan-casing I is located near the top of the casing, but above the partition *d'*, so that it opens directly into the side of chamber D, the air taking the course indicated by the arrows.

In Fig. 4 the fan-casing is located in chamber G below chamber D and between it and trunk B, and the fan-casing communicates with the trunk B through opening *b'* by a spout *i'*, in which is a regulating-valve *i'*. In this case air is sucked from chamber G and forced through trunk B into chamber D. In all these cases the air-circuit is maintained in the same direction, the different locations of the fan varying somewhat the effect of the currents in the chambers D G, but not affecting the force of current through the trunk.

In Fig. 3 the upper end of partition *d'* may be hinged and constitute a large valve *d'*, which can be shifted, as indicated by dotted lines, so as to vary the relative sizes of chambers D and G somewhat. The fan J, the feed-roll conveyers, and scraper - belts may be driven by any suitable means—as, for instance, as indicated in Fig. 2.

Operation: The fan being started, a continuous air-current is produced within the casing, as indicated by the arrows. The force of said current is necessarily greatest in trunk B, which is the most contracted. It is weakened in chamber D by expansion of the air, and yet further weakened in chamber G, owing to greater expansion of air or size of said chamber. The lighter grade of material, dust, &c., in the material fed from the hopper into trunk B is separated from the heavier material and carried up over into chamber D. There the current expands, and is consequently slowed up and weakened, and the heavier portion or second grade of the mate-

rial drops into said chamber. The current is again contracted in passing from chamber D into chamber G, in a measure compressing the body of dust in the air-current passing from chamber D, which, however, as soon as it enters chamber G finds ample room to expand, and the dust settles therein, the downward movement of the air-current in entering chamber G assisting in accelerating the precipitation of the dust, &c. Of course where the space is contracted the velocity of the current is greatest and where it is expanded the current is retarded. Hence while a continuous equal current is maintained in trunk B, causing an equal treatment of all material passed therethrough, yet in chambers D and G the velocity of the currents vary considerably, creating eddies and allowing the impurities, dust, &c., greater time for settling by gravity. By providing scrapers in the dust-chamber we dispense with the necessity for converging the walls to direct deposited matters to the trough, and are thereby enabled to greatly enlarge the settling-space and to that degree weaken the air-current in said chamber.

Having described our invention, what we claim as new, and desire to secure by Letters Patent thereon, is—

1. In a combined dust-collector and purifier, the combination of a vertical separator-trunk B, a hopped collecting-chamber D, communicating with the upper end thereof, and a settling-chamber G, communicating with the collecting-chamber at top and with the said trunk at bottom, and a fan whereby a continuous closed air-current is maintained through the trunk and chambers, substantially as described.

2. In a combined purifier, grader, and dust-collecting machine, the combination of a vertical separating-trunk through which the material is passed, a hopped collecting-chamber beside said trunk and communicating with the upper end thereof, provided with a conveyer for removing the material collected therein, and a settling-chamber communicating with the said collecting-chamber and extending below and beneath the said chamber to the trunk and communicating therewith at bottom with a fan for creating a continuous endless air-current through said trunk and chambers, and means for removing the collected matters from said settling-chamber, substantially as specified.

3. In a machine of the character described, a vertical separating-trunk, a collecting-chamber beside said trunk having converging bottoms and a conveyer therein, and a dust-settling chamber communicating with the upper end of said collecting-chamber and extending beneath the chamber and communicating with the trunk, a conveyer and scraper in said chamber, and a fan-casing and fan for creating an endless air-circuit through the trunk and chambers, substantially as and for the purpose set forth.

4. The combination of the casing, the ver-

tical air-trunk at one end thereof, the dust-settling chamber communicating with said trunk near its lower end, and a collecting-chamber communicating with the upper end of said trunk and depending into the settling-chamber and communicating therewith at its upper end opposite the trunk, with a fan-casing, fan, regulating-valve, and mechanism for driving the same, substantially as described.

5. The combination of the casing, the vertical air-trunk at one end thereof, the dust-settling chamber communicating with said trunk near its lower end, and a collecting-chamber communicating with the upper end of said trunk and depending into the settling-chamber and communicating therewith at its upper end opposite the trunk, with a fan-casing, fan, regulating-valve, and mechanism for driving the fan and conveyers in said chambers, and scrapers in the dust-chamber, substantially as described.

6. In a combined purifier, grader, and dust-collector, the combination of a vertical separating-trunk, a collecting-chamber communicating with the upper end thereof, a dust-settling chamber, said collecting-chamber communicating with the trunk, with a fan-casing directly communicating with both the said chambers and located at the upper part thereof, a fan in said casing, and means, substantially as described, for driving the same, substantially as and for the purpose specified.

7. In a combined purifier, grader, and dust-collector, the combination of a vertical separating-trunk, a collecting-chamber communicating with the upper end thereof, a dust-settling chamber below said collecting-chamber communicating with the trunk, with a fan-casing directly communicating with both the said chambers and located at the upper part

thereof, a fan in said casing, conveyers in said chambers, and means for operating said conveyers and fan, substantially as described.

8. The combination of a casing having a vertical separating-trunk B at one end, a feed-hopper communicating therewith, a dust-settling chamber G, communicating with said trunk below the hopper-opening therein, the collecting-chamber D, having converging bottoms depending into chamber G and communicating at its upper opposite ends with the trunk and with the dust-chamber, and a fan and fan-casing, and regulating-valves for creating an endless air circuit or current through the trunk, fan-casing, and chambers, substantially as set forth.

9. The combination of a casing having a vertical separating-trunk B at one end, a feed-hopper communicating therewith, a dust-settling chamber G, communicating with said trunk below the hopper-opening therein, the collecting-chamber D, having converging bottoms depending into chamber G and communicating at its upper opposite ends with the trunk and with the dust-chamber, and a fan and fan-casing, and regulating-valves for creating an endless air circuit or current through the trunk, fan-casing, and chambers, a conveyer in chamber D, and a conveyer and scrapers in chamber G, and mechanism for operating the same, substantially as described.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

HEMAN A. BARNARD.
CHARLES A. BARNARD.

Witnesses:

W. H. HILLHOUSE,
C. V. GOULD.