(No Model.) 2 Sheets—Sheet 1.

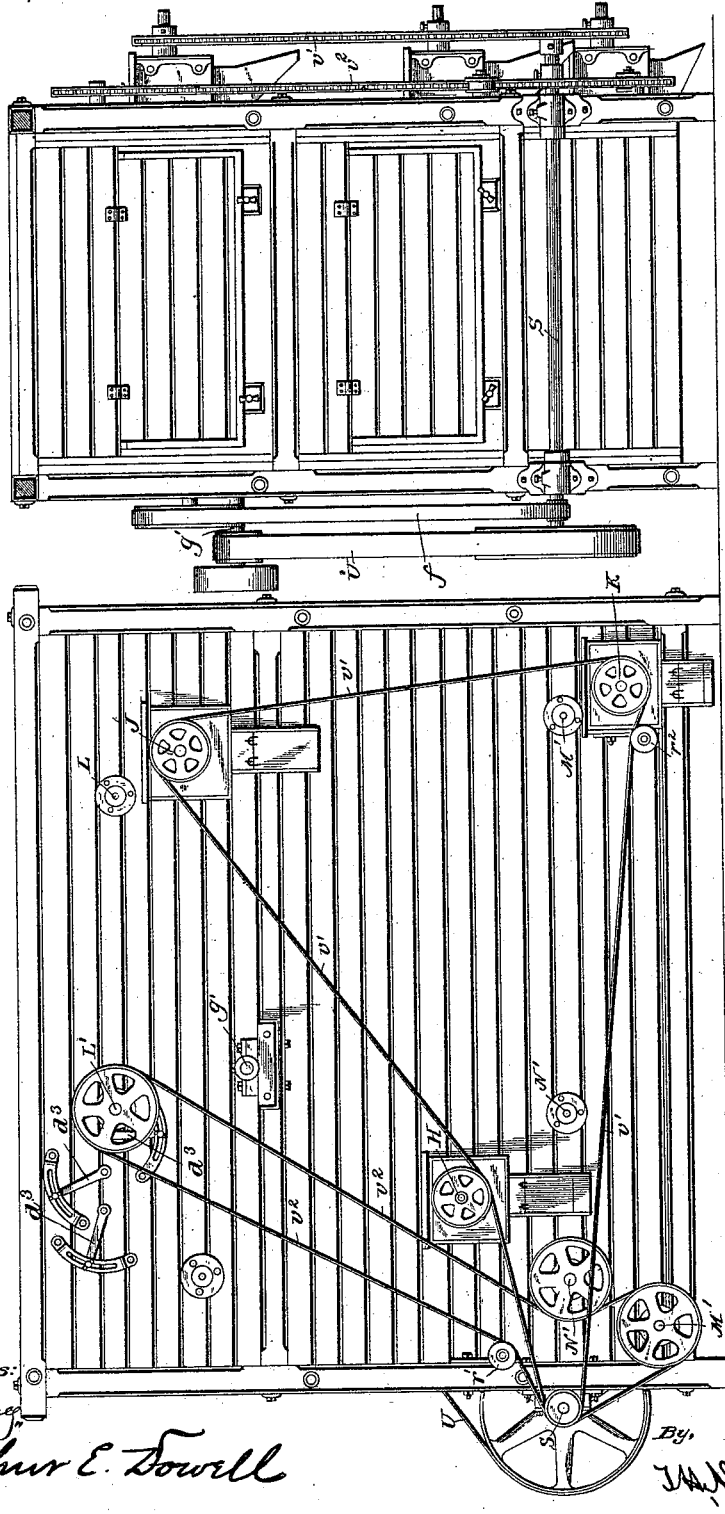
H. A. & C. A. BARNARD.

SELF CONTAINED PURIFIER AND DUST COLLECTOR.

No. 455,270. Patented June 30, 1891.

Fig. 2.

Fig. 1.



Witnesses:
E. W. Goldsberry
Arthur E. Dowell

Inventors,
H. A. Barnard
and
C. A. Barnard
By,
W. Alexander
Attorney.

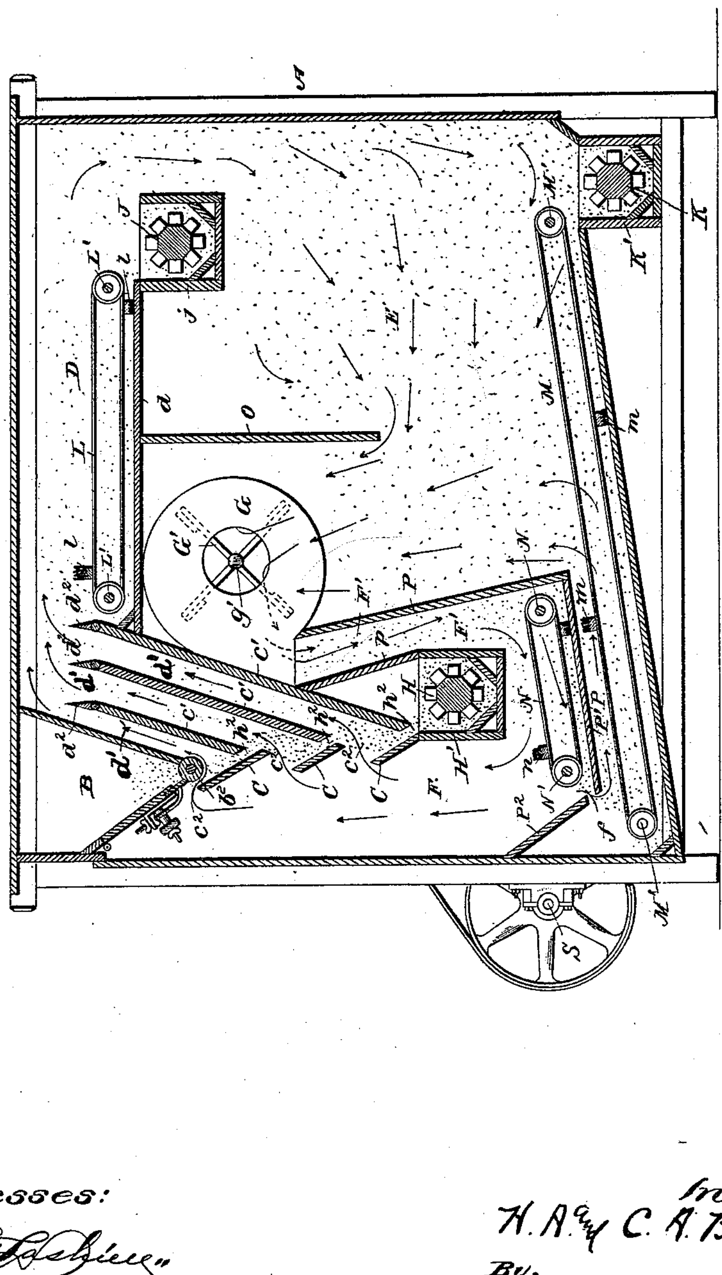
(No Model.) 2 Sheets—Sheet 2.

H. A. & C. A. BARNARD.

SELF CONTAINED PURIFIER AND DUST COLLECTOR.

No. 455,270. Patented June 30, 1891.

Fig. 3.



Witnesses:

[signature]

Arthur E. Dowell

Inventor:

H. A. & C. A. Barnard

By, [signature] Alexander

Attorney.

UNITED STATES PATENT OFFICE.

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

SELF-CONTAINED PURIFIER AND DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 455,270, dated June 30, 1891.

Application filed March 4, 1891. Serial No. 383,782. (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 Self-Contained Purifiers and Dust-Collectors; 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 a part of this specification, in which—

Figure 1 is a side elevation of my improved combined grain separator, grader, and dust-collector. Fig. 2 is an end view thereof. Fig. 3 is a central longitudinal vertical sectional view through the same.

The present invention is an improvement in combined grain separating, cleaning, and dust-collecting machines; and its object is to clean middlings, grain, or any suitable material by air blasts or currents, grading the material by the currents into two or more portions, and separating the dust and other light impurities therefrom, and collecting the dust and discharging each grade of material and the dust at separate points, thus combining in one machine a purifier, grader, and dust-collector.

The machine shown in the accompanying drawings is especially designed for operating upon middlings in the manner stated; and it consists, essentially, of a pair of dust-collecting chambers communicating through a fan-casing and through an upper collecting-chamber and a lower air-passage and a series of conveyers, and separating trunks or passages, and certain other novel details of construction and combinations of parts, as will be clearly understood from the following description and claims.

Referring to the accompanying drawings by letters, A designates the frame or casing of the machine closed on all sides, but having suitable doors provided at various points for allowing access to its interior.

B designates a feed-hopper of ordinary construction, at one upper corner extending transversely of the casing and having a feed-roller b^2 in its mouth and a hinged flap or valve for regulating the flow of material. The feed-roller may be driven by pulleys and a belt f^2 from a shaft S, journaled in boxes secured to one end of the frame.

C C C designate shunt-boards arranged below the hopper, and on which the material fed therefrom drops successively and from the last board falls into a transverse trough H′, in which is a conveyer H that conducts the material out of the machine. $c'c'c'$ are upwardly-inclined boards arranged parallel with each other. Their lower ends approach boards C, respectively. Air-passages c^2 are left above the upper edges of boards C, which passages communicate with the air-passages d', between boards c', respectively, and passages h^2 are left between the lower ends of boards C c', as shown.

d^2 designate valves at the upper ends of boards c', which can be adjusted by fingers d^3 on the outside of the casing, as indicated in Fig. 1, thus regulating the draft through passages d', or in place of valves d^2 a single valve or valves might be placed in the passage connecting the fan-chamber with chamber F, or any suitable arrangement of valves might be used as is obvious, the effect of which will be to regulate or vary the draft or current of air through the passages between chambers F and D.

d designates a transverse horizontal partition in the upper part of the casing extending from near the upper end of the inner board c' to a conveyer-trough j, lying transversely of the casing at the upper corner thereof opposite hopper B, and in this trough is a conveyer J. The space above partition d forms a depositing-chamber D, wherein the second grade of material is deposited, any deposits being swept off into trough j by means of an endless belt L, carrying brushes $l\,l$, and operated by pulleys on shafts L′, journaled in the sides of the casing. A passage is left between trough j and end wall of the casing for the descent of air-currents into the space below partition d, which constitutes a large dust-collecting chamber E.

Just beneath partition d and adjoining the inner board c', is a fan casing or chamber G, in which is a fan G′, mounted on shaft g',

journaled in bearings on the casing. This fan-chamber communicates with chamber E at one end or side, and a vertical partition O is placed between the fan-chamber and trough *j*, so that the current of air passing from chamber D is deflected downward under partition O before it can rise into the fan-chamber.

Below the fan-chamber is a transverse partition P, which extends nearly to the bottom of casing A and connects with a false bottom P′, which extends forward under trough H′ to near the end wall of the casing, and P^2 is an inclined transverse board attached to the casing and extending nearly to bottom P′, having a narrow passage *f* between the same. The space thus separated from chamber E and below boards C and hopper constitute a second dust-collecting chamber F. A board *p* is set between the inner edge of trough H′ and inner board *c′*, forming an air-passage F′, through which air is driven from the fan-chamber into chamber F. Any dust or matters collecting on the bottom of chamber F are swept out through passage *f* by means of an endless belt N, carrying brushes *n* and running over pulleys on shaft N′, journaled in the sides of the casing.

K′ designates a transverse trough in chamber E at the lower right-hand corner of the machine, and K is a conveyer therein. The bottom of chamber E (and casing) inclines from the upper inner edge of trough K′ down to the other end of casing A, below chamber F, as shown, and any deposits on this bottom are swept into trough K′ by endless belts M, carrying brushes *m* and running over pulleys on shafts M′, journaled in the sides of the casing. The conveyers H J K are preferably driven by sprocket-pulleys and belt *v′* from shaft S, (see Figs. 1 and 2,) which is driven by belt U and pulleys from the fan-shaft *g′*, to which power is applied. The conveyers L, M, and N are driven by sprocket-pulleys and belt V^2 from shaft S. *r′* r^2 are tightener-pulleys for said belts.

Operation: The middlings enter hopper B and are fed in a uniform stream of even thickness across the entire width of the machine by roller b^2 and are aspirated by the air-currents that pass through passages c^2 *d′*, and the cleaned middlings of heaviest grade fall into conveyer-trough H′ through passage *h′* and are discharged from the machine by conveyer H. The air-currents (indicated by the arrows) are produced by the fan G′, which causes the air in the machine to circulate through chamber F, then through openings c^2, passages *d′*, into and through settling-chamber D, then into and through dust-chamber E, and finally back into fan-chamber G, thus forming a continuous current. The small opening *f* at the bottom of chamber F, extending across the width of the machine, allows part of the air-current to pass through it into chamber E beneath chamber F and thence back into the fan, thus forming in the machine two continuous air-currents, as shown by arrows, Fig. 3, which serve a double purpose—viz., to draw the dust and light particles that are deposited in dust-chamber F through into chamber E, where the endless carrier M will sweep it to conveyer K, and, second, by dividing and meeting the currents form eddies in the dust-settling chambers E F, which assist in depositing the dust in said chambers. The air-currents passing through openings c^2 and *d′* can be regulated by valves d^2, thus governing the cleaning and grading of the middlings. The lighter middlings, dust, and other impurities which are taken up by the air-current pass through chamber D, wherein separation takes place. The middlings settling therein are delivered by carriers L into trough *j*, and conveyer J discharges them from the machine. The dust and other lighter impurities pass down into chamber E and are deposited on the bottom thereof and conveyed by carrier M into trough K′ and discharged by conveyer K out of the machine. The conveyers H J K have an opening at their discharge ends provided with a suitable valve, through which material can be discharged without admitting air. The machine is cased, and no air admitted or discharged except such as is unavoidable in the admission of material and discharge of same. Partition O in chamber E deflects the dust-laden air downward, thus assisting in settling the dust in said chamber. It will be observed that this machine contains a fan, a separating device, a settling-chamber for middlings, and two dust-separating chambers, an opening through the fan-chamber connecting the dust-chambers, and there are two return air-passages connecting these dust-collecting chambers, thus producing two continuous endless air-currents in both dust-chambers, and the dust taken up by the air passing through the separating device has to travel through both dust-chambers and the air is thus thoroughly deprived of dust before re-entering the separating-passages; also, that the two continuous air-currents meeting and dividing cause eddies to be formed in the dust-chambers, which assist in depositing dust therein. The separating device can have as many or as few air-passages for purifying and grading the middlings as may be desired. The form of chamber F is such that the air in passing through it travels in almost a semicircular direction, and the dust is naturally impelled thereby to the outside edge of the current, and the opening in the bottom of chamber F allows that part of the air-current containing the most impurities to pass through and be again returned to dust-chamber E, and thus made to pass through both chambers again. This forms a cut-off, and assists in making the current of air passing through the separating devices cleaner than it otherwise would be. When the machine is wide, two fans may be mounted on the same shaft.

Having thus described our invention, what we claim as new is—

1. In a combined middlings-purifier, grader, and dust-collector, the combination of a separating device having a series of air-passages across which the material must pass, means for discharging the purified material collecting in it, a settling-chamber for collecting the lighter middlings drawn out in the process of purifying, and two dust-settling chambers, each provided with devices for discharging the material deposited therein, with a fan and mechanism for imparting motion thereto, substantially as described.

2. The combination, in a separator and dust-collector combined, of an air-blast separating device and two dust-chambers communicating with said device for collecting the dust drawn up by the air-current with a secondary air-passage connecting the two dust-chambers, and means for creating a circulation of air in said passages, whereby a part of the dust-laden air can be returned to the first dust-chamber and made to pass through both chambers again, substantially as set forth.

3. The combination, in a combined separator and dust-collecting machine, of a dust-collecting chamber, a depositing-chamber above the same, air-blast passages through which the material to be cleaned is passed interposed between and connecting the said chambers, a second dust-collecting chamber below the deposit-chamber communicating with the first-mentioned dust-chamber, and a fan-chamber and fan between and communicating with both dust-chambers, substantially as set forth.

4. The combination of the hopper, the inclined boards below the same forming air-passages through which the material delivered from the hopper must pass, and a receiving-trough for the material falling from said boards, a deposit-chamber above said boards, two dust-collecting chambers below the deposit-chamber and hopper, respectively, and a fan-chamber communicating with said dust-chambers, and a fan whereby continuous air-currents are created through said chambers and air-passages, substantially as described.

5. The combination of the hopper, inclined boards below the same on which the material delivered from the hopper falls, and a receiving-trough for the falling material, a deposit-chamber above said boards, two dust-collecting chambers below said deposit-chamber and hopper, respectively, a fan-chamber communicating with said dust-chambers, and a fan whereby a continuous air-current is created through the said chambers and between said boards, with conveyers for removing the material from said receiving-trough, deposit-chamber, and dust-chambers, substantially as specified.

6. The combination, in a combined purifier, separator, and dust-collector, of two dust-collecting chambers, a fan-chamber communicating with said chambers, a series of air-blast passages above one dust-chamber through which the material is passed to be cleaned, a deposit-chamber above said passages communicating with the other chamber, and a fan for creating a continuous current through said chambers and passages, substantially as described, with an air-passage leading from one dust-chamber to the other, whereby a second air-current is created in the larger dust-chamber below the fan, substantially as described.

7. The combination of the air-blast separating device, the dust-collecting chamber below the same, and a fan-chamber opening into said dust-chamber below the air-passages, with a second dust-collecting chamber indirectly communicating with the top of the first dust-chamber through said separating device and again communicating with said first dust-chamber through an opening in the bottom thereof, and also communicating with the fan-chamber, whereby a continuous current of air may be created through the fan-chamber, separating device, and dust-chamber, and a secondary continuous air-current be simultaneously created through the fan-chamber and dust-chamber only, substantially as and for the purpose set forth.

8. The combination of the main casing, the hopper therein, the inclined boards below the same, the dust-chamber F, and the collecting-chamber D, communicating through the passages between the boards, with the fan-chamber below chamber D, communicating with chamber F, the dust-collecting chamber E, communicating with chamber D and with the fan-chamber, substantially as specified.

9. The combination of the main casing, the hopper therein, the inclined boards below the same, the dust-chamber F and the collecting-chamber D, communicating through the passages between the boards, and the fan-chamber below chamber D, communicating with chamber F, the dust-collecting chamber E, communicating with chamber D and with the fan-chamber and the conveyers in said chambers, and the brushes in chambers D E, substantially as specified.

10. The combination of the main casing, the hopper therein, the inclined boards below the same, the dust-chamber F and the collecting-chamber D, and the fan-chamber below chamber D, communicating with chamber F, the dust-collecting chamber E below the fan-chamber and communicating therewith and extending beneath chamber F and communicating therewith through the bottom thereof, substantially as described.

11. The combination of the main casing, the hopper therein, the inclined boards below the same, the dust-chamber F, collecting-chamber D, fan-chamber G, and dust-collecting chamber E below the fan-chamber and communicating therewith and extending beneath chamber F and having a direct communication with chamber F through its bottom, the

brushes in chambers D, F, and E, and the conveyers H J K, all substantially as described.

12. In a combined purifier, grader, and dust-catcher, the dust-chamber F, aspirating-passages c^2 and d', and settling-chamber D above chamber F, and dust-settling chamber E below chamber D, in combination with the fan-chamber G, through which chambers F and E communicate, and fan G', substantially as and for the purpose specified.

13. The combination of the fan-chamber G, dust-chamber F, aspirating-passages c^2 and d', and settling-chamber D above chamber G, dust-settling chamber E below chamber D, communicating with the fan-chamber G, forming an endless air-passage, and valves d^2 for controlling the air-currents, substantially as specified.

14. The combination of the hopper B, aspirating-passages c^2 and d', valves d^2, settling-chamber D, dust-chamber E, fan-chamber G, dust-chamber F, and conveyers K J H, whereby the material admitted through hopper B will be purified, graded, and dusted and each grade discharged separately, all constructed and arranged substantially as specified.

15. The combination of the hopper B, aspirating-passages c^2 and d', valves d^2, settling-chamber D, carrier L, dust-chamber E, carrier M, fan-chamber G, dust-chamber F, carrier N and conveyers K J H, and fan G', all substantially as specified.

16. In a combined purifier, separator, and dust-collecting machine, the combination of a hopper, the inclined boards C c' below the hopper, and the trough H' and conveyer H, the dust-collecting chamber F below said boards and trough, the brushes n in chamber F, the deposit-chamber D at top of the machine communicating with chamber F, the conveyer-trough j, and conveyer J, and brushes l', the dust-collecting chamber E below chamber D, communicating therewith and extending under chamber F and communicating therewith through its bottom, and the trough and conveyer K and brushes m in said chamber, with the fan and fan-chamber communicating with chambers F and E and adapted to create continuous air-currents through the machine, and the deflecting-partition O in chamber E, substantially as specified.

17. In an endless air-current separating-machine having a continuous air-passage, a separating device, a fan-chamber and one or more settling-chambers, each chamber being flat-bottomed and provided with both a scraper for continuously cleaning the bottom and a conveyer for removing the material collected by the scrapers, in combination with a fan and mechanism for imparting motion to said fan, scrapers, and conveyers, whereby larger settling-chambers are obtained, the dust more effectually settled, and the air in said air-passage made more free of dust before it again enters to the separating device, substantially as and for the purpose set forth.

18. In a separator and dust-collector, the combination of an air-blast separating device, a flat-bottomed settling-chamber below the same, a second flat-bottomed settling-chamber indirectly communicating with the first chamber through the said air-blast device and through a fan-chamber, with the conveyers for removing collected material from said chambers, and traveling scrapers or brushes for sweeping the collected matters off the bottoms of said settling-chambers to the conveyers, substantially as described.

19. In an endless closed air-current dust-collecting machine, the combination of a fan-chamber, a fan, and a dust-chamber having substantially vertical walls, and large flat-surfaced bottom, with traveling scrapers or brushes adapted to sweep the collected material off the bottom of the dust-chamber, and mechanism, substantially as described, for laterally moving said scrapers or brushes over the bottoms of the dust-chambers, substantially as set forth.

20. In a combined separator and dust-collector having an endless air-current, the combination of a settling-chamber, an air-blast separating device, a second settling-chamber communicating with the first through said separating device, both said chambers having flat bottoms, with a fan-chamber establishing communication between the settling-chambers below the separating device, traveling scrapers or brushes for scraping collected matter off the bottoms of said chambers, and means for operating said scrapers, all substantially as specified.

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:
LUTE H. PIKE,
T. M. VAN HORN.