

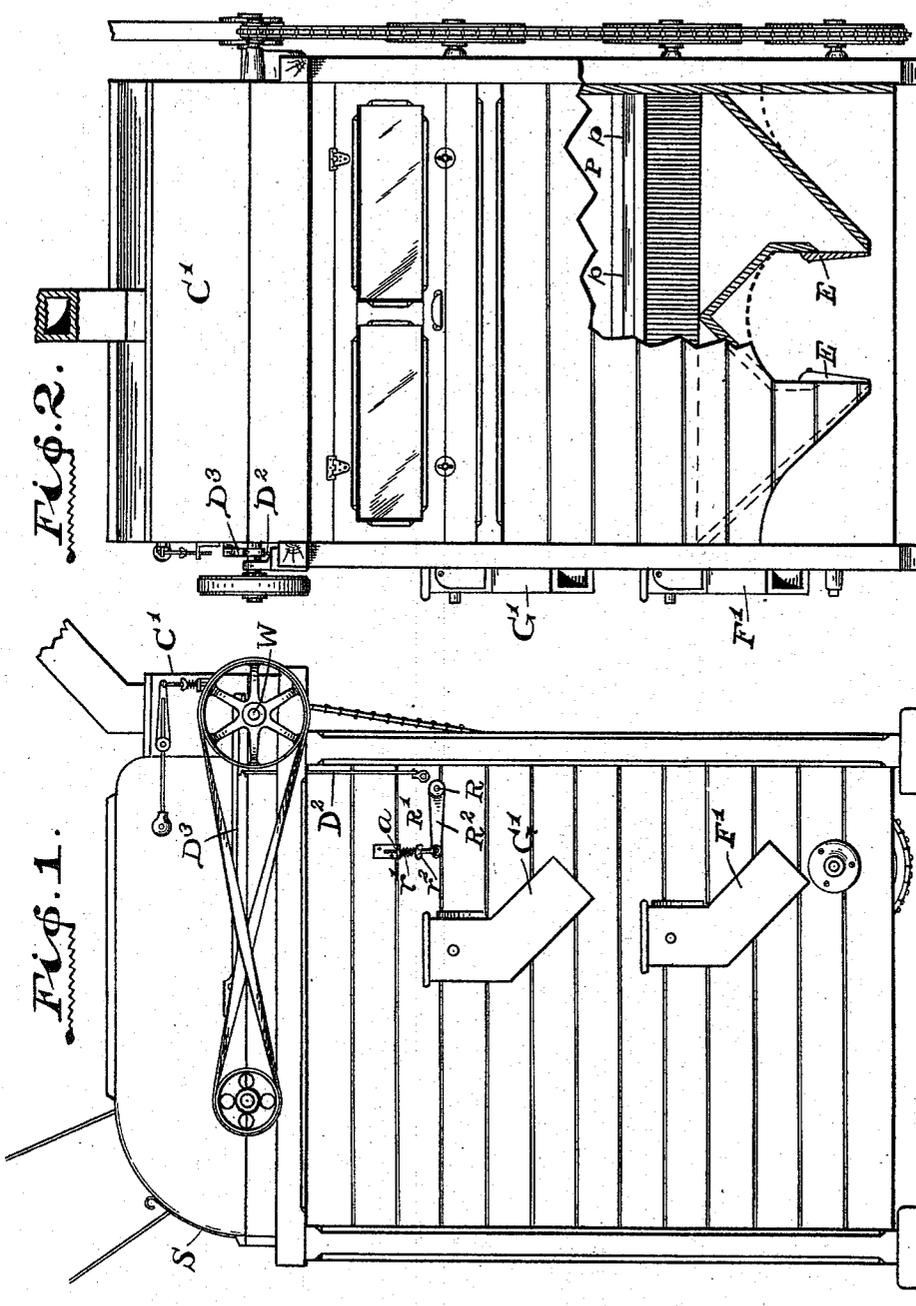
(No Model.)

2 Sheets—Sheet 1.

J. WARRINGTON.
RETURN AIR PURIFIER.

No. 527,910.

Patented Oct. 23, 1894.



WITNESSES:

J. H. Warner.
J. L. Walsh.

INVENTOR

Jesse Warrington,

BY

Chester Bradford,
ATTORNEY.

UNITED STATES PATENT OFFICE.

JESSE WARRINGTON, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE
NORDYKE & MARMON COMPANY, OF SAME PLACE.

RETURN-AIR PURIFIER.

SPECIFICATION forming part of Letters Patent No. 527,910, dated October 23, 1894.

Application filed May 19, 1893. Serial No. 474,753. (No model.)

To all whom it may concern:

Be it known that I, JESSE WARRINGTON, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Return-Air Purifiers, of which the following is a specification.

My present invention relates to that class of machines whereby more than one separation of pulverized material, such as grain products produced in milling, is effected in a single passage through the machine, and it consists in certain improvements in such a machine, whereby its efficiency is increased, which improvements will be first fully described, and then pointed out in the claims.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1, is a side elevation of a machine embodying my said invention; Fig. 2, an end elevation, a portion of the casing being broken away to show interior parts; Fig. 3, a central sectional view; and Fig. 4 a horizontal sectional view taken partly at each of several points, as indicated by the various dotted lines 4 4 in Fig. 3.

In said drawings the portions marked A represent the outside casing and frame-work of the machine; B, the fan; C, the feed gate in the hopper; D, a second feed gate; E, discharging gates for the first separation; F and G, conveyers for the second and third separations, and H a carrier or conveyer for the final separation, which is the fourth in the construction shown.

The frame-work and casing are of a suitable character for the purpose, and support bearings for the various mechanism, and has proper doors for access to the interior, as shown, and as will be readily understood. Its construction will also be readily understood from the drawings.

The fan B is an ordinary exhaust fan set within a casing inside the machine, as shown, and its eyes communicate with the upper interior part of said machine or an opening in the lower front side of the casing furnishes the proper escape for the blast. A slide S,

preferably of sheet metal and bent to conform to the exterior of the fan casing, regulates the discharge.

As will be observed by an inspection of the drawings, especially Fig. 3, the air in the machine is passed through the same continuously, and in the various directions indicated by the arrows on said Fig. 3, and is thus used over and over again in the process of separation.

The air current in passing upwardly from the bottom to the top of the machine all passes through the passage P about half way to the top, and then, instead of passing directly up as would be the case if the gate D were omitted, is deflected by said gate and the deflecting board A⁵, and passes around, by a sort of by-path, over the pocket formed by the boards A³ and A⁴, and up into the two passages X and Y, and thence to the fan.

It will be observed that the passage X is directly above and in line with the passage P, and is of substantially the same size, or perhaps a little larger, while the passage Y is alongside the passage X and receives a portion of the air, thus reducing the current somewhat in the passage X.

The deflecting board A⁷ at the head of the passage Y may be adjusted as desired, so that the amount of air passing through this passage may be controlled. This is important, as it determines the strength of the air current to which the material shall be subjected when it first enters the machine, and when, as will hereinafter be more fully described, a portion of the impurities are taken off thereby, before said material descends to where it receives its principal treatment.

The gate C is set in the feed hopper C', and is adapted to regulate the passage of material through said feed hopper into the passage X as may be desired, and as will be readily understood.

The gate D is positioned lower down, and practically forms a second hopper, which receives the bulk of the material from the hopper C', and feeds it through into the main air blast. A block or bar D' is given a rapid vertical movement, being carried by a hanger

D² extending from a vibrating bar D³, which in turn, is given its motion by a cam on the shaft W. The block D' wedges between the gate D and the adjacent portion of the frame A, and at each downward movement forces said gate D slightly apart from the board forming the other side of the hopper, permitting a small quantity of the material to sift through into the passage P below, up which the current of air is coming, but, with the contained material effectually excludes said air, and compels it to take another course around said hopper as indicated by the arrows. The gate D is held in the opposite or closed direction by an arm *r* on a rock-shaft R, which is given a yielding or elastic movement by means of a spring *r'* on a rod R' connected to said rock-shaft by an arm R². A nut *r*² on the rod R' serves to adjust the spring (which is interposed between said nut and a stop *a*) so that the force against the gate may be more or less, as may be desired. The arm R² gives considerable leverage, so that while the spring is comparatively slight, it will operate promptly and efficiently upon the gate D through the mediums described.

The gates E are positioned at the bottom of pockets or hoppers within the structure of this machine, and directly below the passage P down which the material must fall from the gate D, and up which the air current passes. The result is that such of the material as is too heavy to be carried by the air current will fall into these hoppers or receptacles, and be discharged through these gates E, while the lighter will be carried up by the air current, as will be presently described.

The conveyer F is situated in the bottom of a hopper-shaped pocket in the machine formed by the boards A³ and A⁴, and below the deflecting board A⁵. The air current in passing over this hopper takes a curved course, as indicated by the arrows, and occasioned by the hopper-gate D and said deflecting board A⁵, and the current will thus be caused to deposit a portion of its load of material into this pocket, whence it will be taken by said conveyer F, and discharged through the spout F' to the outside of the machine. The material deposited in this pocket is next heavier in grade to that discharged through the gates E.

The conveyer G is in the bottom of a second hopper-shaped pocket, the sides of which are the partitions A³ and A⁶, and, by means of the formation of the interior of the machine, is caused to receive a further portion of the material carried by the air current which is intercepted by the deflecting boards A⁷ and A⁸. The machine in use is so adjusted that all the material of any value which has not been previously precipitated, is thus deposited in this pocket, and carried out by the conveyer G through the side G' to the outside of the machine.

The air current in continuing on its course

enters the eyes of the fan B, carrying with it the remaining material, which is only the fine impalpable dust and light fluffy material, mainly consisting of impurities, and of slight value, which it is desired shall be separated from the remainder or better material, and carried off by itself. This dust or comparatively valueless material is next to be separated from the air, so that the air may return through the machine and continue the operation thereof. I have illustrated as a device for so separating the dust from the air, a structure containing cloth tubes into which the air will pass and through the fabric whereof it may escape while the dust itself is precipitated into a chamber beneath. This structure, however, is not of my invention, and, therefore, will not be further described herein.

The carrier or conveyer H consists of chains having cross-bars H' mounted thereon, and upon these cross-bars are scrapers *h* which are set diagonally, and in passing over the floor A⁹ of the chamber tend to scrape the material not only toward the end into the discharge orifice O, but also toward the center, while a single scraper *h'* is set at right angles with the direction of movement, and draws the fine material or dust directly into said orifice O. This discharge orifice is of comparatively small size, and is located centrally at one end of the chamber.

The operation of said machine may be briefly recapitulated as follows: The fan, being set in motion, starts a current of air through the machine in the directions indicated, which meets on its way the material as it descends from the hoppers through the passages below. It first comes in contact with the material as it leaves the gate C, and takes therefrom a portion of the impurities, or dust, and carries it on to the fan, thus partially freeing the material from said dust, or comparatively valueless portions, at once upon its entering into the machine. The material next passes down through the gate D, whence it is sifted slowly by the operation of said gate and its attachments, as has been described, into the main air passage P, which is a substantially vertical passage, having projections *p* secured to its walls for the purpose of breaking up the direct line of the draft, and more efficiently distributing the material through the air blast ascending said passage. Said air blast or current is thus enabled to act upon every part of the material, and will carry off with it, upwardly, all except the heaviest and best thereof, which latter falls into the pockets or hoppers terminating in the gates E, and is taken off through said gates, as has already been described. The remainder passes on, and, coming in contact with the deflecting boards A⁵, A⁷ and A⁸, is further separated, until finally the dust and fluffy stuff, of little or no value, passes

through the fan, and is thence discharged into the chamber H, whence it will be removed, as has already been described.

By a single machine I am thus enabled to effect several separations of the material—four such separations being described—which, as will be readily understood by those skilled in the art, is an extremely desirable result, being a saving of machinery with the consequent advantages of economy of space and power. I am also enabled to bring a portion of the air current in contact with the material where it first enters the machine, thus freeing said material from a considerable portion of its impurities before it reaches that point where it is subjected to the full strength of said air current, and thereby relieving said main air current from a portion of the work which it would otherwise have to do, and carry off directly to the fan a large portion of the impurities and fine fluff and comparatively valueless material without subjecting it to any further operation. This result is accomplished, as has already been described, by the duplication of the passages at or near the top, and the means of adjustment provided.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a return air purifier, of an exhaust fan located at one side of the machine, an ingress gate for the material located at the other side of the machine, an air passage X alongside the said hopper into which the material is discharged, an adjustable air passage Y alongside said passage X and separated therefrom by a short partition, a hopper below said air passage X into which the material is discharged therefrom, a single air passage P below said hopper with a deflector above said passage, the air current being thus concentrated and increased in force at the lower portion of the machine and divided and reduced in force at the upper portion, substantially as shown and described.

2. The combination, in a return air purifier, of an exhaust fan located in the upper portion of the machine to one side, a hopper provided with a gate through which the material may be introduced into the machine at the other side, air passages below said gates provided with deflector boards above them, pockets alongside the air passages into each of which a portion of the material is deposited in its passage, being aided in so doing by said deflector boards, one or more of which said deflector boards is adjustable, passages leading to the eye of the fan, and an adjustable discharging orifice to the fan with a partition leading from the fan casing to near the bottom of the machine, a chamber in the bottom of the machine to receive the dust, gates below the main air passage at the other side of the machine to discharge the heavier material,

and gates at the sides of the machine leading from the pockets to discharge the grades of material deposited therein, substantially as shown and described.

3. The combination, in a return air purifier, of the exhaust fan, a hopper in the upper part of the machine having a discharging gate, an air passage into which the material is discharged, a second hopper at the bottom of said air passage, a gate in the bottom of said hopper which is normally held closed and which discharges into an air passage below, mechanism by which said hopper is rapidly and intermittently opened permitting the passage of material while excluding the passage of air, the said air passage below said hopper, and receiving pockets alongside said air passages, the whole being arranged and operating substantially as set forth.

4. The combination, in a return air purifier, of a fan a passage extending substantially from the top to the bottom of the machine, connections from said passage to said fan a hopper at or near the top of the machine and alongside said passage, and a second hopper formed within said passage by a swinging gate, and a by-path leading to a depositing chamber and around said second hopper whereby the air blast first passes through material falling from said second hopper, and dropping particles taken from same in said depositing chamber, continues on its passage around by said by-path and again comes in contact with the material where it is fed in from the first hopper, thus acting upon the material twice on its way from the bottom to the top of the passages, the last action being upon the fresh material just entering the machine, thus at once removing a portion of the impurities, substantially as set forth.

5. The combination, in a return air purifier, of the exhaust fan, the hoppers and gates for admitting material, air passages alongside said hoppers and gates, pockets alongside said passages and hoppers, a space below said pockets having gates to discharge the heavier material, and a single passage P leading from said space up to the other passages and the pockets, said passage having triangular strips or projections *p* at intervals along its sides, substantially as shown and described and for the purposes specified.

6. The combination, in a return air purifier, of a chamber having a comparatively small discharging orifice at one end, and a conveyer consisting of chains, cross-bars and diagonally set scrapers on said cross-bars whereby the dust is both drawn forward and toward said discharging orifice, and a scraper set across the line of movement of said conveyer whereby the dust is drawn into said discharging orifice, substantially as set forth.

7. The combination, in a return air purifier, with the other separating mechanism, of a separate chamber for the dust and compara-

tively valueless parts, orifices in the top of
said chamber for the admission of said dust,
a discharging orifice at one end of said cham-
ber, a conveyer H in said chamber consist-
5 ing of chains, cross-bars, and diagonally set
scrapers on said cross-bars, whereby the dust
is drawn forward and toward the opening,
and a scraper set at right angles with the line
of movement, whereby said dust is drawn into

said discharging orifice, substantially as set 10
forth.

In witness whereof I have hereunto set my
hand and seal, at Indianapolis, Indiana, this
12th day of May, A. D. 1893.

JESSE WARRINGTON. [L. s.]

Witnesses:

H. H. RICE,

A. N. DWYER.