

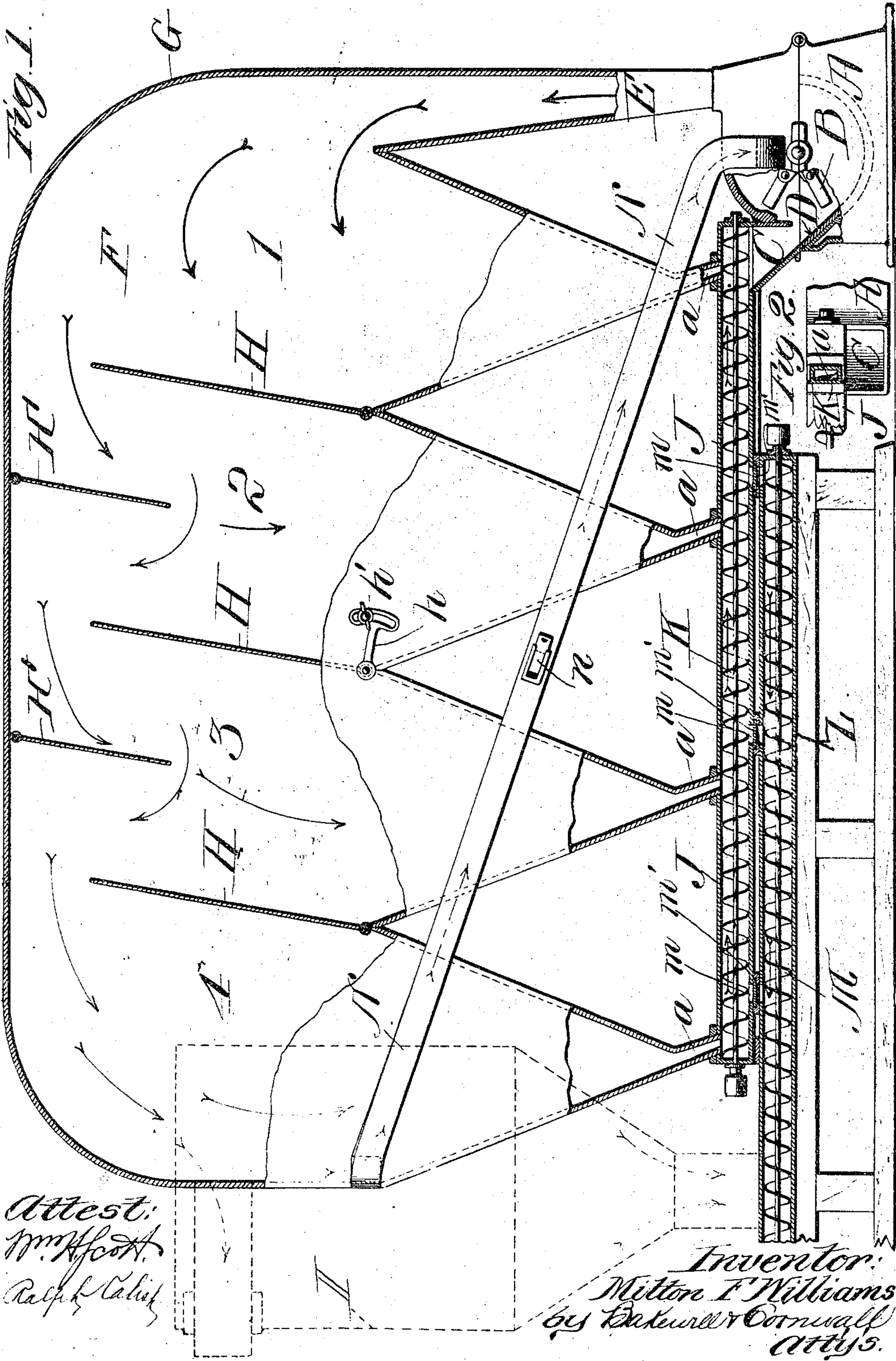
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SEPARATOR.

(Application filed Jan. 30, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 657,993, dated September 18, 1900.

Application filed January 30, 1899. Serial No. 703,847. (No model.)

To all whom it may concern:

Be it known that I, MILTON F. WILLIAMS, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Separators, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic view, partly in side elevation and partly in section, of my improved separator. Fig. 2 is a detail view taken above the feed-hopper of the pulverizer and showing the manner of returning the tailings thereto.

This invention relates to a new and useful improvement in separators designed to be operated in connection with a pulverizing machine or machines, the object of said separator being to assort or grade the material after it has passed through the pulverizer, and such material as is not of sufficient fineness for the finished product is returned to the pulverizer as tailings, while the finer or finished material is delivered in suitable chambers, from which it is taken and conducted to any desirable point.

The essential features of my invention consist in the construction, arrangement, and combination of the several parts of my improved separator, in combination with a pulverizer, all as will hereinafter be described and afterward pointed out in the claims.

In the drawings, A indicates a pulverizer consisting of a suitable casing, in which is mounted a shaft carrying hammer-supports, which hammer-supports have pivoted in them suitable hammers B. These hammers operate on material fed into the pulverizer through a suitable hopper C by primarily crushing the material on a dead-plate D and afterward carrying said material around on a grinding-surface and so acting on the material as to reduce it to the required degree of fineness. The hammers, which are revolved at a high speed, act practically as fan-blades, in that they draw a current of air in through the

hopper and cause the same to circulate around in the machine. I take advantage of this fan action of the pulverizer and arrange an outlet-spout E, through which said current of air and carried particles of material acted on by the hammers pass, preferably in an upward direction, discharging into a chamber F. This chamber F is within a suitable casing G and is divided into a number of compartments, as 1, 2, 3, and 4, more or less, as desired, by hinged or pivoted partitions H. These partitions H extend transversely the chamber F and are preferably pivoted at their lower edges, being made adjustable by a slotted crank-arm h, cooperating with a locking thumb-screw h', which holds said partitions in their adjusted positions. It will be obvious that the heavier particles of material forced upwardly through spout E will fall by reason of gravity into the bottom of the first chamber, and as the air has a comparatively easy escape over the first partition H such particles as are light enough to be carried with the air will be forced over said first partition, and then if the air loses its force on any of the particles gravity will assert itself and cause said particles to fall into the second chamber. The air not finding a ready escape through the bottom of this second chamber will pass on over the second partition and lose some of its carried particles in the third chamber, the air continuing beyond said third chamber and carrying the very fine particles into the fourth chamber, whence the air escapes with some of its fine particles into a centrifugal dust-collector, (marked I in the drawings and indicated by dotted lines,) whose operation is well understood. The bottoms of the respective chambers before referred to are preferably formed inclined, terminating in discharge-openings a, which open into a trough J, said trough containing a screw conveyer K, driven in the proper direction to return the material to the hopper C of the pulverizer, into which hopper said conveyer finally discharges some or all of the material falling into trough J.

Located under trough J is another trough L, containing a screw conveyer M, operating to force such material as falls into said trough

L in the opposite direction from that which falls into trough J, conducting said material to any desired point or receptacle into which the finished material is finally received.

5 Openings *m* are arranged in the bottom of trough J slightly in advance of the discharge-openings of chambers 2, 3, and 4 with respect to the direction of travel of screw K, said openings discharging into trough L and being controlled by slides *m'*. It is contemplated that the heavier particles which fall into chamber 1 will never be of sufficient fineness required of the finished material, and for that reason no provision has been made

15 for introducing the same into the discharge-trough L. If the material falling into chamber 2 is of sufficient fineness, the slide *m'* in advance thereof is opened, so that screw K instead of returning said material to the pulverizer will carry the same to the opening *m*,

20 where it will drop through into the trough L and be conducted off by the screw M. If, however, the material in chamber 2 is not of sufficient fineness for finished material, said slide in advance of its opening is closed, and

25 screw K will thereupon carry the same onward to be discharged into the pulverizer-hopper. The same is alike true with respect to chamber 3—that is, if the material falling

30 thereinto is of sufficient fineness the slide in advance of said chamber permits said material to fall into the trough L and be carried off, or if the material is not of sufficient fineness the slide is closed to permit said material

35 to be returned to the pulverizer. The same is true with relation to chamber 4.

The air after having dropped most of its particles in passing through chamber F still contains fine particles, which, as before described, may be passed through a dust-collector, (shown in dotted lines,) which discharges the collected dust into trough L, to be finally taken to a receptacle for the finished product, or a pipe N may be employed

45 in lieu of a dust-collector, through which the dust-laden air is conducted back to the eye of the pulverizer.

The high speed at which the pulverizer operates will induce a strong current of air through pipe N, and such suction is utilized to reconduct the fine particles of dust back to the pulverizer, whence they are immediately forced upward again through spout E to pass through chamber F and fall into any

55 of the receptacles provided therefor.

While I have shown a pulverizer which in itself creates a blast of air used in carrying the particles into the separator, still it is obvious that the pulverizer could discharge into

60 a spout, which spout led into a fan, said fan delivering the particles in a forced blast into the separator, and, furthermore, where the finished particles are received in the several compartments instead of providing a return-conveyor

65 and switching said particles off from said return-conveyor to an outcarrying-conveyor it

is obvious that the particles in these compartments can be spouted to a receptacle for the finished product. I have also shown curtain-walls H' suspended from the top of the casing F between the partitions H for the purpose of compelling the air in passing through the chamber in said casing to travel in a serpentine or tortuous path, the bend at the bottom of said partitions H' giving to the particles a definite direction, momentum carrying them into the "dead-eddy" in the bottom of the compartments, thus assisting said particles to settle by removing them out of the path of the direct current of air, and so rendering the separator more efficient.

In the event that it is desired to admit air into the return-pipe N, I provide the same with one or more slides *n*. When these slides are open, the back pressure in the separating-chamber is directed in forcing the particles through the opening in the bottoms of the several receptacles.

I am aware that minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

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

1. The combination with a pulverizer of the type described, of a separating-chamber F, a spout E, leading into the chamber F, adjustable partitions H dividing said chamber into a number of separate compartments which are open to each other over the tops of said partitions, a pipe N leading from the last compartment back into the eye of the pulverizer, an air-gate *n* in said pipe, a trough J communicating independently with each compartment into which the material falling in said compartments is discharged, a screw conveyor K in said trough for conveying all or part of said material back to the pulverizer, a trough L located under trough J, and communicating therewith through openings *m*, arranged in advance of the communications between trough J and the compartments, slides *m'* for controlling the openings *m*, and a screw conveyor M in trough L, substantially as described.

2. The combination with a rotary pulverizer, of a separating-chamber F, a spout E leading from the pulverizer to said chamber F, through which the pulverized material is forced by the pulverizer to the separating-chamber, partitions dividing said chamber into a number of separate compartments, a pipe N leading from the last compartment back to the eye of the pulverizer, an air-gate *n* in said pipe N, a trough J communicating independently with each compartment, into which trough, material falling into said compartments is discharged, a conveyor in said trough adapted to convey the material from

each compartment back to the pulverizer, a second trough communicating with the first trough through openings arranged in advance of the communications between the first
5 trough and compartments, gates for controlling said openings, and a conveyer in the second trough, substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 25th day of January, 1899.

MILTON F. WILLIAMS.

Witnesses:

F. R. CORNWALL,
WM. A. SCOTT.