

(No Model.)

J. M. CASE.
DUST CATCHING FAN.

No. 419,316.

Patented Jan. 14, 1890.

FIG. I.

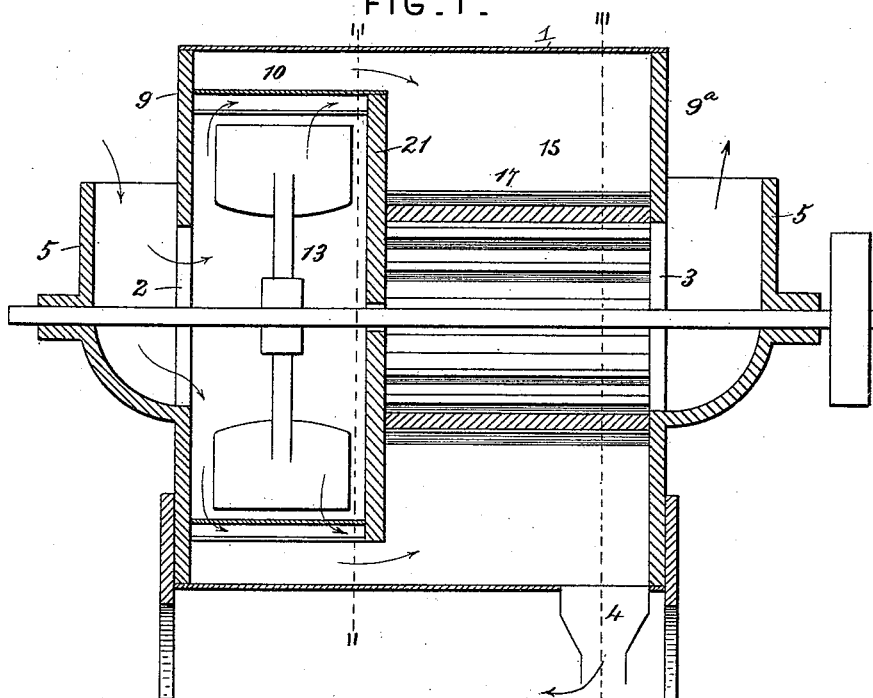
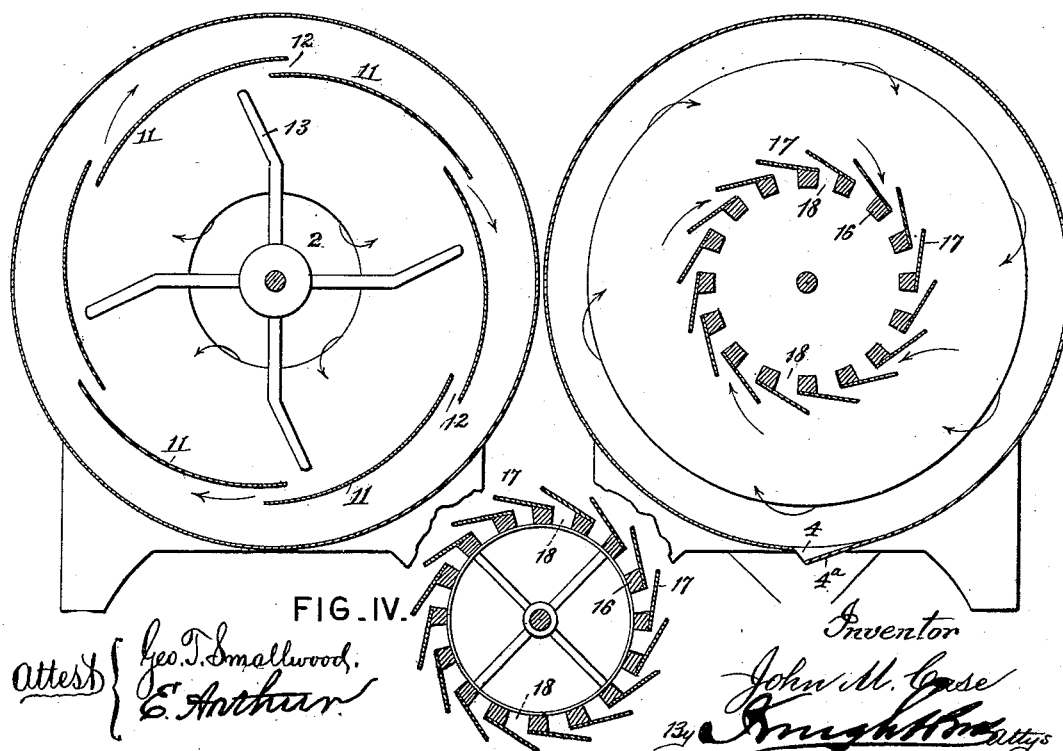


FIG. II.

FIG. III.



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UNITED STATES PATENT OFFICE.

JOHN M. CASE, OF COLUMBUS, OHIO, ASSIGNOR TO THE CASE MANUFACTURING COMPANY, OF SAME PLACE.

DUST-CATCHING FAN.

SPECIFICATION forming part of Letters Patent No. 419,316, dated January 14, 1890.

Application filed February 13, 1889. Serial No. 299,758. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. CASE, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Dust-Catching Fan, of which the following is a specification.

My invention relates to that class of dust-collectors in which the dust is separated from the air by being allowed to settle in a settling-chamber, and in which the separating operation is assisted by a centrifugal motion imparted to the air. As is well known, the successful operation of this class of machines is dependent upon a rapid but even and unbroken current of the dust-laden air moving circularly around the chamber, the dust particles moving to the outside and then settling by virtue of their greater specific gravity. For accomplishing this result machines have been constructed; but the serious and fatal objection to those machines is that the current is not constant, and different currents interfere with each other to materially defeat the objects of the machine.

My present invention has for its object the more perfect accomplishment of this purpose; and to this end it consists in a cylindrical settling-chamber having at one end an axial opening for the inlet of dust-laden air, at the other end an axial opening for the outlet of purified air, at the bottom a tangential opening for the outlet of dust, and surrounding the two axial openings cylindrical guards mounted coaxially with the settling-drum and provided with a number of narrow tangential orifices, the tangential orifices of the outlet-guard and the dust-outlet opening in the opposite direction to those of the inlet-guard, and a fan preferably, though not necessarily, located in the inlet-guard. By this means I am enabled to accomplish the desired object, for in practice I find that with a machine thus constructed a fan preferably located within the induction-guard and having its eye at the axial inlet-opening produces a constant, easy, and unbroken circular current of air within the settling-drum, the air passing around several times, and finally through the tangential openings in the outlet-

guard to the air-discharge opening in the axis of the drum. The dust, being heavier, is impelled by its momentum to the outer part of the cylindrical chamber, and, settling, passes out through the tangential opening in the periphery of the drum.

In order that my invention may be fully understood, I will describe the same with reference to the accompanying drawings, and then particularly point out the same in the claims.

In said drawings, Figure I is an axial section of my device, taken in the vertical plane of the dust-outlet. Fig. II is a transverse section on the line II II, Fig. I, looking toward the inlet end. Fig. III is a transverse section on the line III III, Fig. I, looking in same direction. Fig. IV shows a modification.

I is a cylindrical drum, which constitutes the settling-chamber, and which is provided with an axial inlet-opening 2 at one end for dust-laden air, an axial opening 3 at the other end for the outlet of purified air, and a tangential opening 4 in the periphery for the discharge of dust. The axial openings 2 and 3 are each about one-third the diameter of the drum and arranged coaxially therewith. The dust-discharge opening 4 is a narrow slot formed with an overlapping wing 4^a, which permits the dust to escape when moving centrifugally in the proper direction and after it has passed outward to the periphery of the drum and is carried by the movement of the air toward the discharge end thereof. Surrounding the axial openings without are shields 5, which adapt the machine for any suitable supply and outlet connections for the air. These shields may be secured in any desirable manner to the drum-heads 9 9^a, or formed integrally therewith, if they are of metal. Within the drum 1 are mounted the induction and eduction guards 10 and 15, arranged end to end coaxially with the drum and separated by a tight partition 21. The induction-guard 10 is preferably about three-fourths the diameter and one-third the length of the drum, while the outlet-guard is about one-third the diameter and two-thirds the length of the drum. The tangential openings

12 of the inlet-guard are preferably formed by the segments 11, arranged with their edges overlapping, but not in contact, in such a manner that the openings are all in one direction.

I prefer to locate the fan 13, as shown, within the inlet-guard, and to construct it with backwardly-inclined blades. The fan-shaft may be conveniently mounted in bearings in the external shields 5. This location and construction of the fan and the formation of the inlet-guard within which it works adapt it to exert a direct force on the dust-laden air, driving it through the tangential openings in the guard and setting up a strong circular or vortical current within the drum.

While the location of the fan as herein shown is preferable, it is obvious that the suction-chamber could be located at any other desirable point and communication made with the inlet-guard of my settling-drum, as is done with dust-catching drums in common use.

The tangential openings 18 in the outlet-guard are somewhat different in construction from those of the inlet-guard. They are preferably formed by tangential metallic blades 17, extending from the ribs 16, said ribs being circumferentially arranged at the proper distance apart. These tangential openings 18 in the outlet-guard, as also the tangential dust-outlet, are set in the opposite direction to the inlet-openings 12, so that the dust and air, which receive a vortical motion from the action of the fan 13, located within the inlet-guard, aided by the peculiar form of said guard, will pass freely through their respective outlets at the discharge end of the machine.

From the above-described arrangement it will be seen that as the dust-laden air enters the upper axial orifice 2, constituting the eye of the suction-fan, it is forced out through the narrow opening 12 into the narrow space 19, (about one-eighth the diameter of the drum in width,) whence it circles around and forward into the broader chamber 20, where the particles of foreign matter, by virtue of their greater specific gravity, pass outward. The circling motion continues in an oblique direction until the air passes through the openings 18 and reaches the axial opening 3, which is the only free outlet, while the dust is discharged through the opening 4 by centrifugal action. The small area of the opening 4 and the presence of the dust prevent the escape of air in any large quantity at the periphery of the drum, and as soon as it moves inward to the free exit it leaves its dust behind. A slight escape of air through the contracted opening 4 only aids in discharging the dust and does not impair the separating action, by reason of the more free outlet of air afforded by the axial opening 3. Any suitable receptacle or arrangement may be used in connection with opening 4 for receiving the dust. The direct tangential action of the fan-blades upon the dust-laden air,

driving it through the tangential openings 12 in the inlet-guard, prevents back-pressure and maintains an effective vortical and centrifugal action in the entire volume of air and dust passing through the machine, the dust being forced to the periphery by its superior momentum in opposition to the centripetal movement to and through the numerous tangential openings 18 in the outlet-guard to reach the free outlet. These tangential openings in the outlet-guard serve to subdivide the air-current, causing a uniform exhaust from all directions and preventing a strong and direct flow in any one direction to the discharge-opening, which would in a measure overcome the centrifugal momentum of the dust and carry it to the air-discharge. I thus insure effective centrifugal action and consequent separation of dust under all conditions of air-supply, whereas in machines where this effective centrifugal action is not maintained, when the miller desires to use a light air-current, the dust is liable to be carried through with the air.

My machine thus effectually avoids the irregular and interfering currents of air which would impair the operation. By maintaining a steady and constant current substantially uniform over the whole area I effect a complete separation of the dust and air, and am thereby enabled to reduce the size of the machine considerably.

Being provided with its own suction-fan, this machine constitutes a dust-catcher complete in itself.

My invention is carried into effect equally well by a modified construction in which the cylindrical outlet-guard is connected to the shaft by arms, (shown in Fig. IV,) so that the said outlet-guard with its tangential blades, being disconnected from the casing, will rotate with the shaft and fan and in unison with the rotary movement of the air, so that the air, impelled by pressure of the fan and freed from dust by the centrifugal movement of the latter, will pass to the outlet through the tangential openings 18 in the guard as freely as if neither the air nor the guard were in rotation.

Having thus described the construction and operation of my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A dust-collector consisting, essentially, of a settling-drum having axial openings for inlet and outlet of air, and a tangential opening for outlet of dust, suitable guards surrounding the axial openings and having tangential openings for the passage of air, and means for forcing air through the tangential openings of the upper guard, the tangential openings in the dust-outlet and lower guard being arranged oppositely to those of the upper guard, all substantially as and for the purpose set forth.

2. A dust-collector consisting, essentially, of a cylindrical drum having axial openings

for the inlet and outlet of air, and a tangential opening for the passage of dust, cylindrical guards arranged coaxially with the chamber over its axial openings and having each tangential openings, and means for setting up a current of air through the drum, the tangential openings of the dust and air outlets being arranged oppositely to those of the inlet-guard, substantially as and for the purpose set forth.

3. In a dust-collector, the combination, with a cylindrical settling-drum 1, having axial openings 2 3 and tangential opening 4, of the large cylindrical guard 10, arranged coaxially over the axial inlet 2, forming a narrow annular space 19, and having tangential openings 12 communicating with said space, a smaller cylindrical guard 15, located coaxially over the axial outlet 3, forming a large annular space 20, and having tangential openings communicating with such annular space 20, and means for forcing air through the openings of the upper guard, the tangential openings of the dust-outlet and lower guard being arranged oppositely to those of the

upper guard, all substantially as and for the purpose set forth.

4. In a dust-collector, the combination of the following parts, to wit: a cylindrical settling-drum 1, having axial openings 2 3 and tangential opening 4, set in opposition to the current of air, shields 5 over the outside of the axial openings, a guard 10, mounted coaxially with the drum over the opening 2, and having tangential openings 12, formed by overlapping segmental plates 11, a guard 15, mounted coaxially with the drum over the opening 3, and having tangential openings 18, formed in the opposite direction to those of guard 10 by vertical ribs 16, and overlapping wings or plates 17, a shaft 7, passing axially through the machine and having journals 6 on shields 5, and a fan 13, located in guard 10, mounted on shaft 7, and adapted to draw air through the opening 2 and discharge it through opening 12.

JOHN M. CASE.

Witnesses:

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