(No Model.) 4 Sheets—Sheet 1.

W. A. COCKRELL.

DUST COLLECTOR.

No. 410,152. Patented Sept. 3, 1889.

Fig. 1.

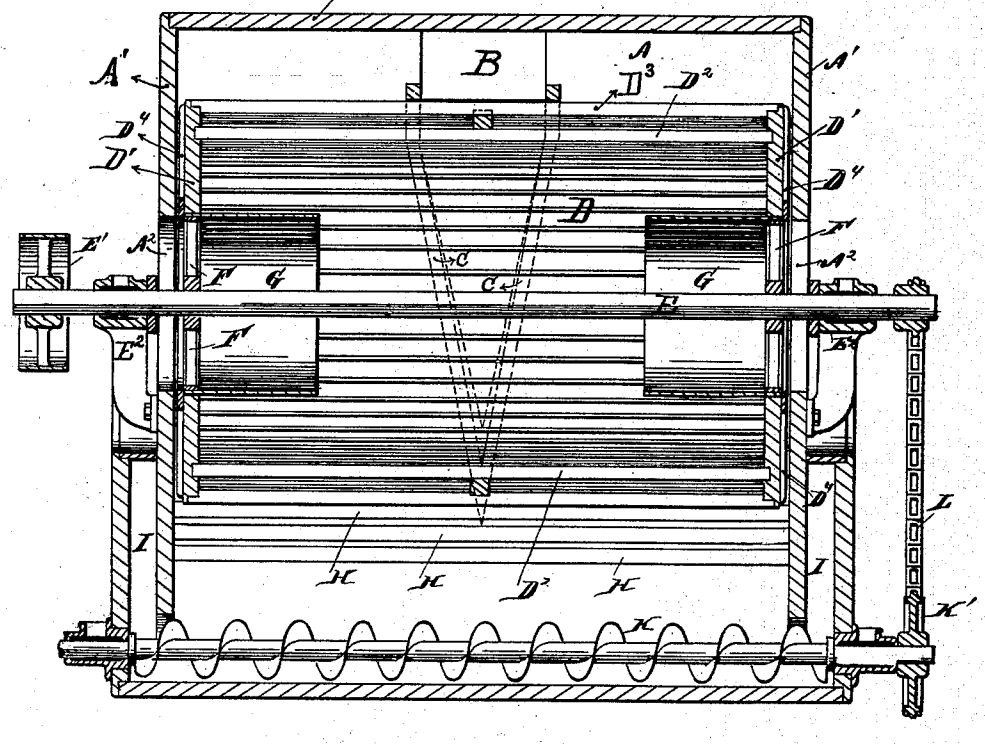
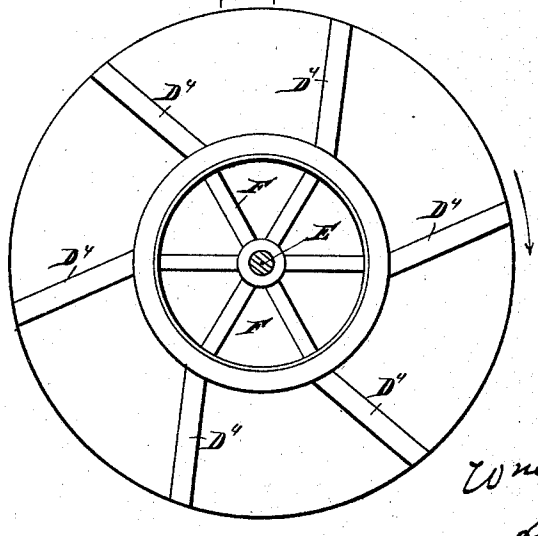


Fig. 2.



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(No Model.)

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Fig. 3.

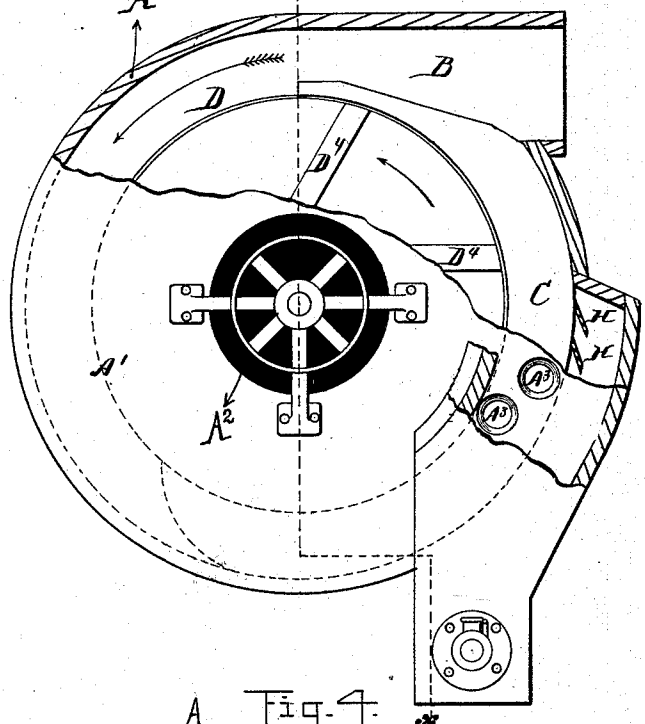
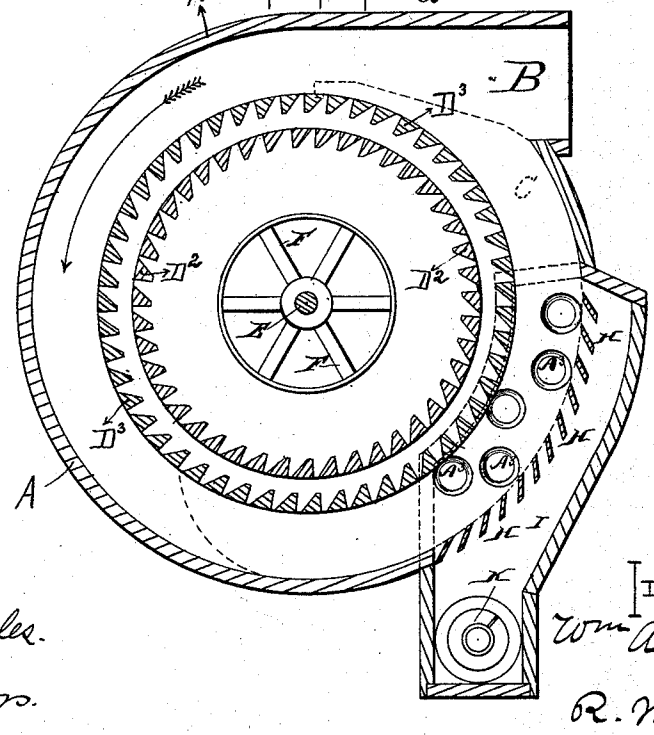


Fig. 4.



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(No Model.)

4 Sheets—Sheet 3.

W. A. COCKRELL.

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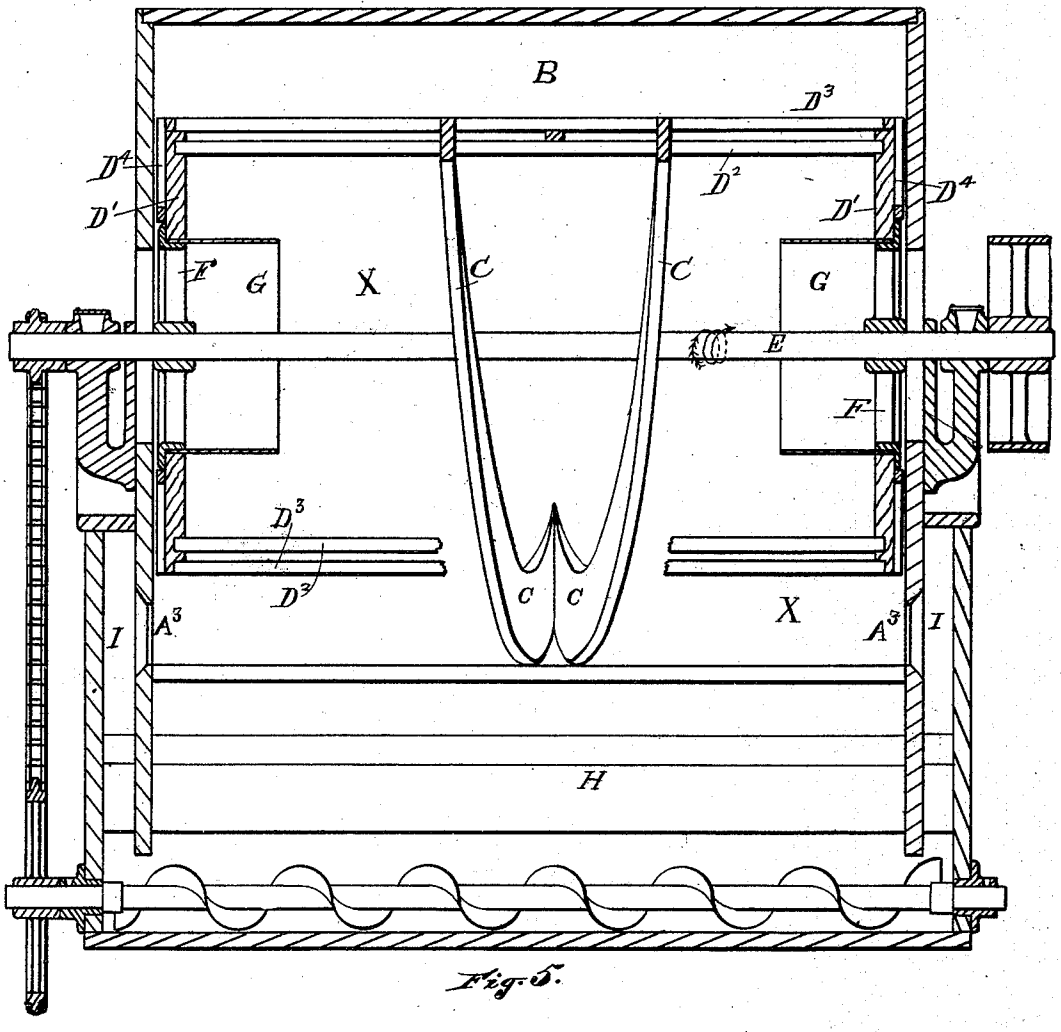


Fig. 5.

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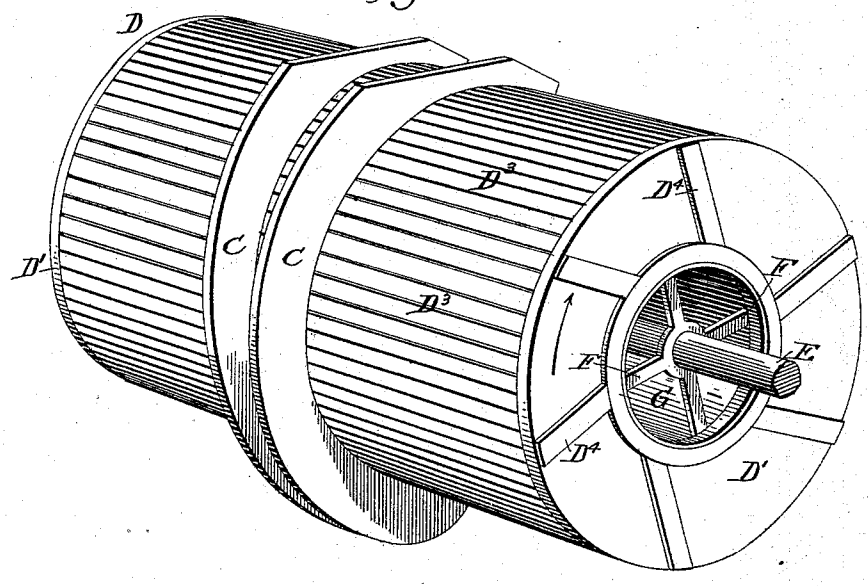
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W. A. COCKRELL.

DUST COLLECTOR.

No. 410,152. Patented Sept. 3, 1889.

Fig. 6.



Witnesses:
James F. Duhamel
Horace A. Dodge.

William A. Cockrell,
Inventor,
Rodney Mason,
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by Dodger & Sons,
Asso. Atty.

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UNITED STATES PATENT OFFICE.

WILLIAM A. COCKRELL, OF DAYTON, OHIO.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 410,152, dated September 3, 1889.

Application filed July 2, 1888. Serial No. 278,872. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. COCKRELL, of Dayton, in the county of Montgomery and State of Ohio, have invented a new and useful Improvement in Dust-Collectors, of which the following is a specification.

The object of my invention is the more perfect separation of the particles of solid matter from the air; and this end I claim to accomplish by a machine which imparts to the air while moving in a vortex within the separation-chamber an additional impulse which serves to maintain or even increase the velocity, thereby imparting a stronger centrifugal force than is attainable where the movement of the current is diminished by friction and obstruction.

This invention consists in novel combinations of mechanism for accomplishing the foregoing separation and imparting to the air-current in the separation-chamber an accelerated movement.

In the annexed drawings, making a part of this specification, Figure 1 is a longitudinal vertical section upon the line *x x* of Fig. 3. Fig. 2 is an end view of the revolving cylinder. Fig. 3 is an end elevation, partly in section. Fig. 4 is a transverse vertical section. Fig. 5 is a longitudinal vertical section with parts broken away; Fig. 6, a view illustrating the wedge-shaped partition hereinafter referred to.

The same letters are employed in all the figures in the indication of identical parts.

A is the casing forming the separation-chamber X. It is substantially circular in cross-section, and is formed with heads A′, having circular openings A^2 for the escape of the air.

B is an air-induction pipe arranged tangentially to the casing A, and intended to deliver the dust-laden air into the interior chamber X, around which it sweeps in a vortical motion.

D is a rotating cylinder carried upon a shaft E, which is revolved by a pulley E′, connected by a belt with any convenient driving-pulley, and has its bearings on brackets E^2, bolted to the heads of the case. The cylinder D is formed with two annular heads D′, connected by stay-rods D^2, and also by a series of blades D^3, which are arranged in one or more rows around the entire circumference of the rotating cylinder, as shown in the drawings.

The precise form of the blades D^3 and rods D^2 is not essential, though I deem it expedient to make them of the form shown in cross-section in Fig. 4—that is to say, with their forward faces radial to the axis of the drum and their rear faces inclined or tangential to a circle of smaller diameter than the drum—the purpose being to produce a surface through which the air may pass into the interior of the cylinder, while avoiding the production of a strong outward blast of air, which would tend to preclude the air from entering the cylinder. The purpose of the cylinder is to prevent the retardation of the inflowing current of air by reason of frequent impulses upon the surface of the central cylinder, as would be the case were the cylinder stationary instead of being arranged to rotate. This cylinder is intended to be driven at a peripheral velocity greater than that of the entering current of dust-laden air, and the blades D^3 act upon the air-current to maintain or even increase the velocity of the air driven into the chamber. This cylinder is driven in the same direction as the vortical current, and the blades D^3 impel it forward to prevent that loss of velocity which is incident to the action of other machines of this class.

Between the casing and the cylinder D a wedge-shaped partition C is placed, which is intended to separate the air-current and give to the divided currents respectively a direction toward the ends of the machine. This wedge-shaped partition is indicated by dotted lines in Figs. 1 and 3 and is shown in Figs. 5 and 6.

To prevent the dust-laden air from flowing through the space between the heads D′ of the cylinder and the ends A′ of the case and escaping through the opening A^2, I place upon the heads D′ ribs D^4, inclined back from the radial line in the manner common in fan-blades, as shown, and nearly filling the space between D′ and A′, which, as they rotate rapidly with the cylinder, drive back the air into the space between the periphery of the cylinder and the casing, and thus prevent its escape in that direction. The shaft E is connected to the annular heads D′ of the cylin-

der by spiders F, with flanges upon their periphery, between which and the heads D′, I secure the outer ends of the tubular air-escape G, which is of the same diameter as and is placed in line with the holes A^2.

H H are overlapping gather-boards placed in the line of the curve of the separation-chamber and in the ascending segment, between which the dust thrown outwardly by centrifugal force and carried forward by the action of the vortical current is intended to escape, falling into a dead-air chamber I, formed by an extension of the case, as clearly shown in the drawings; thence it falls into the conveyer K and is carried away to a delivery-spout.

The conveyer may be revolved by a link belt L, extending from a sprocket-pulley on shaft E to one on the conveyer-shaft, (shown at K′.)

A greater portion of the dust, by reason of the direction given to the dust-laden current by the wedge-shaped partition C, impinges against the heads of the casing A′, and to permit its ready escape I form holes A^3 through the heads A′, through which the dust may pass into the dead-air chamber and thence to the conveyer. These holes are chamfered on their edges, so as to cause them to pass diagonally through the casing, in order to receive the flying dust more directly in the line of its movement. They are so disposed as to entirely occupy some part of the entire space between the cylinder and the periphery of casing, in order to insure the escape of the dust swept along or toward any part of that surface.

The operation of the machine is as follows: A current of dust-laden air is driven by the fans of the purifiers or other machines through the pipe B into the separating-chamber, where the solid particles are driven toward the ends and periphery of the casing and swept forward until, on the ascending segment, they escape through the openings provided for the purpose and fall through the dead-air chamber into the conveyer-trough. The rapidly-revolving cylinder, by means of its blades D^3, maintains the current at its highest velocity, thus maintaining the intensity of the centrifugal action, and also causing an excess of pressure above the normal in the separation-chamber. Such an excess of pressure would usually react on the air-induction and interfere with the action of the purifier-fan; but by imparting to the air in the separation-chamber an accelerated movement, although there is an increase of pressure, it is so drawn away from the mouth of the air-induction pipe as that it is not felt on the purifier or other fan. This action I believe to be entirely novel. The force of the action of the blades D^3 is, however, not sufficient to prevent the air escaping from the interior of the vortical current through the space between the blades in obedience to the pressure maintained in the separation-chamber and escaping from the interior of the cylinder through the tubular discharges G and openings A^2.

While I have used with satisfactory results a cylinder having blades D^3 formed substantially as shown in the drawings, I do not wish to be limited to the precise form shown, for such blades may be varied in form without substantially departing from my invention. I have shown such blades as arranged in two rows; but one I have found sufficient to produce good results, or more may, if preferred, be employed.

The form of the machine may also be modified without altering substantially its principle of operation. Thus the air may be introduced at either end, or below or above, or the machine may be made to stand upright. Wherever the induction-pipe is located it must, however, have such direction as that the dust-laden air delivered into the interior of the case shall receive a vortical movement, sweeping around the inner surface of the casing, whereby the particles of solid matter carried upon the current shall, by the action of centrifugal force, have a tendency to move outward, and being restrained by the casing to be swept around its surface. The air thus entering with an already established velocity receives from the blades D^3 an additional impulse, tending to accelerate the movement of the current, in which respect my machine is radically different from that class of machines in which the vortical motion is derived from rotating blades operating in conjunction with an auxiliary suction-fan, while my machine belongs to that class in which the vortical movement is due to the form of the casing and the tangential direction of the induction-pipe, so that the cylinder acts upon an already established current and in the line of its movement, its function being merely to maintain or accelerate the velocity of the vortical current.

For the cylinder D may be substituted any rotating fan formed to revolve within the chamber, and having blades so formed as to give the forward impulse to the vortical current, and yet at the same time with spaces between, left open for the escape of the air after it has given up the dust which entered the casing with it.

I have called D a "cylinder" for brevity merely. I do not intend to claim the exclusive right to any sort of a cylinder in a dust-collector, for cloth cylinders have been suggested by others. I employ the word in this specification as designating a revolving body formed with blades which are capable of giving a forward impulse to the vortical current, and having open spaces for the outflow of the air from the separation-chamber through the interior of the cylinder into the atmosphere.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a dust-collector, the combination, with the tangential air-induction pipe B and

casing A, of a revolving cylinder D, having blades D^3 and independently driven in the direction of the movement of the vortical current, substantially as set forth.

2. In combination with the tangential air-induction pipe B, casing A, provided with openings A^3, and revolving cylinder D, a wedge-formed partition C, interposed between the cylinder and casing, substantially as set forth.

3. In combination with the air-induction pipe B, casing A, and revolving cylinder D, inclined ribs D^4, placed between the heads A′ and D′ and attached to the latter, substantially as set forth.

4. In combination with the tangential air-induction pipe B, casing A, and revolving cylinder D, the tubular air-escape G, attached to the cylinder and in line with the opening A^2, substantially as set forth.

5. In combination with the tangential air-induction pipe B, casing A, and separation-chamber X, the dead-air chamber I and overlapping gather-boards H, placed between said chambers, substantially as set forth.

6. In combination with the air-induction pipe B, casing A, revolving cylinder D, and partitions C, holes A^3, formed in the end of the casing, and a dead-air chamber I, substantially as set forth.

7. In combination with the air-induction pipe and the separation-chamber of a dust-collector, the holes A^3, formed in the end A′ of the casing, for the escape of the dust, substantially as set forth.

8. In combination with the air-induction pipe and separation-chamber of a dust-collector, the holes A^3, formed in the end A′ of the case and cut transversely through the same, substantially as set forth.

9. In combination with the air-induction pipe and separation-chamber of a dust-collector, the revolving cylinder D and openings through the case for the escape of the dust peripherally and at the end, substantially as set forth.

In witness whereof I have hereunto subscribed my name in the presence of three attesting witnesses.

WILLIAM A. COCKRELL.

In presence of—
JOHN M. SPRIGG,
EDWARD L. RUNE,
WEBSTER W. SHURY.