(No Model.)

W. D. SMITH.

DUST COLLECTOR.

No. 451,139. Patented Apr. 28, 1891.

Fig. 1.

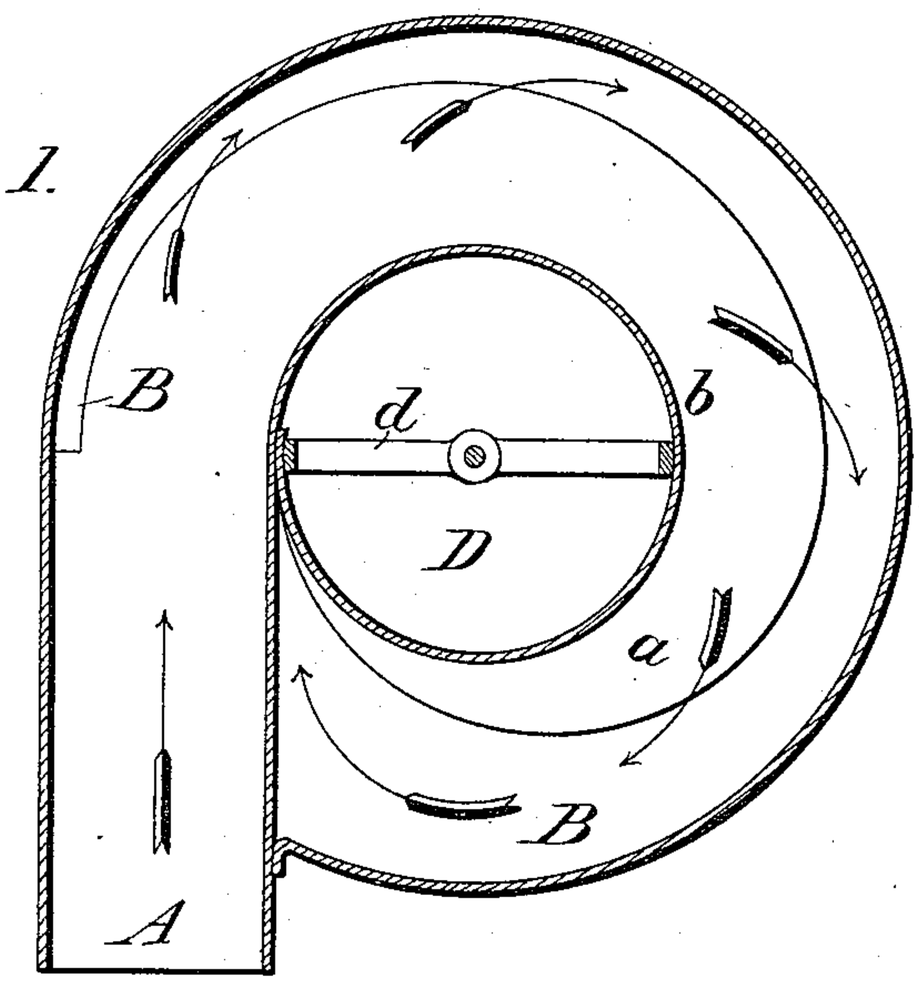
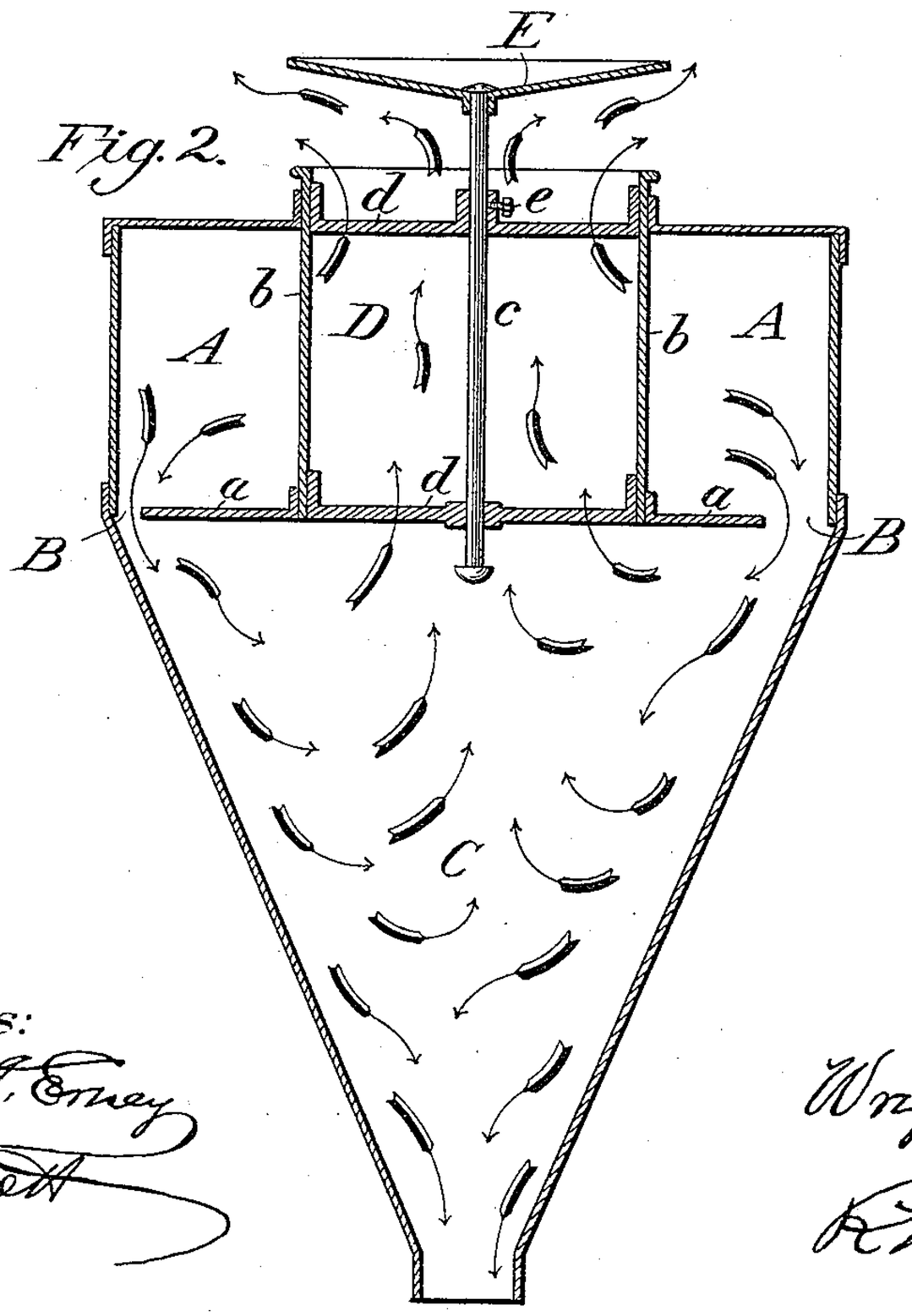


Fig. 2.



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UNITED STATES PATENT OFFICE

WRIGHT D. SMITH, OF DETROIT, MICHIGAN, ASSIGNOR TO THE HUYETT & SMITH MANUFACTURING COMPANY, OF SAME PLACE.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 451,139, dated April 28, 1891.

Application filed September 30, 1890. Serial No. 366,698. (No model.)

To all whom it may concern:

Be it known that I, WRIGHT D. SMITH, of the city of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Dust-Collectors, of which the following is a specification.

My invention relates to that class of dust-collectors in which a current of air laden with dust, shavings, &c., is caused to revolve in the interior of a chamber in such manner as to cause the deposition of the specifically-heavy particles by centrifugal action against the wall of the chamber down which they travel toward an orifice in the bottom, while the air freed from the solid particles escapes at the top of the chamber.

In the drawings hereto attached and making a part of this specification, Figure 1 is a horizontal section through the air-induction pipe, and Fig. 2 is a vertical central section of the entire machine.

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

The casing illustrated in the drawings is preferably made of sheet metal. The air-blast is generated by a suction-fan or other form of blower in the usual manner, and it carries on its current dust, shavings, or whatever analogous light material it may be desired to move, which I will refer to hereinafter under the general designation of "dust." The separation takes place in a conical chamber, such as is in familiar use, and will be more fully described hereinafter. This chamber is represented as arranged with its axis in vertical position, though this is not indispensable. The pipe A is bent to form an elbow, the outer and inner walls of which are segments of concentric circles, and extends until it abuts against itself, and so forms what I shall call a "return-elbow," although this expression is not intended to operate as a term of limitation to an elbow which actually terminates against the pipe; but the air is delivered into the upper end of the separating-chamber through a slot B, which is cut in the bottom *a* of the pipe where it lies against the end of the chamber, and gradually increases in width from the beginning to the end of the elbow, as clearly shown in Fig. 1. As the air is constrained by the pipe to take a direction conforming to its shape when it enters the elbow, it will be diverted into a circular path, and it will consequently develop a centrifugal action upon the solid particles wafted by the current, so that they will tend to accumulate, but without actual separation in that portion of the current which is contiguous to the exterior wall of the elbow, and consequently the slot B should extend inwardly from that wall, so that the air and solid particles may find an unobstructed delivery from the pipe A into the separating-chamber. This slot in the case as illustrated is in the wall *a* of the elbow which lies upon and forms part of the end of the chamber; but the elbow may obviously be separated from the chamber and the independent walls connected by a throat instead of a mere slot in the partition-wall. This arrangement of the slot also permits the air to be discharged downwardly into the separating-chamber near its wall, and as the slot uniformly increases in width from the induction end of the elbow, where it is quite narrow, to the stopped end, where it may be expanded so as to extend entirely across the full width of the elbow, and as the pressure of the air is greatest at the induction end of the elbow and gradually diminishes toward the stopped end, it follows that there will be an approximately uniform distribution of the dust-laden air around the wall of the separating-chamber from the beginning to the end of the slot or throat, because the width of the slot increases as the pressure diminishes. The effective portion of the pipe in relation to the dust-collectors is that which is curved to form the return-elbow. Anything beyond that is a mere connection with the fan-case, and its length and position must be governed by extraneous circumstances and the laws of pneumatics. The chamber C is preferably in the form of an inverted truncated cone, such as is well known in this class of machines, and the separation takes place in the usual manner. The current of dust-laden air is introduced as nearly as possible equally around the interior wall of the separating-chamber with a combined downward and rotary movement, caus-

ing it to descend spirally, depositing the specifically-heavier particles on its interior face to pass down to the small opening in the apex, while the air in the center of the vortex formed by the rapidly-gyrating current escapes through the comparatively-larger opening formed in the other end of the tube D, which in the case as illustrated is formed by the inner wall *b* of the return-elbow, which closes on itself. This tube is cylindrical in form, being formed by the inner wall of the return-elbow, and is of the length of the entire depth of the air-induction pipe. It therefore affords an equal draft all around its circumference.

As it is sometimes desirable that a greater or less amount of air shall escape through the smaller end with the solid matter, provision is made for regulating this by a damper acting to more or less open or close the area of discharge through the large tube D. This may be done by an ordinary damper-valve, such as is used in chimneys and other forms of tubes. I have shown, however, what I regard as a preferable form of valve for regulating this outflow. This consists of a cup-formed disk E, carried on the end of a rod *c*, which slides freely in eyes formed in bridge-trees *d*, placed across the tube D at or near its extremities. This disk will be lifted by the escaping air-current and will fall on the end of the tube D when the blast is stopped. Weights may be placed in the cup to load the valve more or less to adapt it to air-currents of variant force. A set-screw *e* is tapped through a collar surrounding the rod *c*, by means of which the valve may be made fast, if desired, to establish a fixed discharge of air through the tube D. This set-screw is, however, intended to be used only when for any reason it may be desired to fix the disk in place. When the dust-collector is in usual operation, it is intended that the disk shall be free to move up and down with variations in the force of the air-blast.

I do not claim the disk, broadly, as a valve automatically shifting its position up or down, for I am aware that flap-valves have been used upon the air-escape openings from dust-collectors, and also disks of metal free to play up and down on stationary rods; but the former are objectionable, because they necessarily cause an irregular air-escape out of the opening, which is contracted on one side, and so will disturb the interior air-current. The latter are liable to be lifted more on one side than on the other, and therefore bind on the vertical rods which guide its motion, and so do not play freely up and down.

The disk which I use for a valve is slightly conical in form with its apex down, and is carried on a sliding rod held in two bearings at a distance from one another, and so the air escapes freely all around the disk without any impediment whatever, and the rod, being guided by two bearings, can move only in a right line, and so is not liable to bind in its bearings, while its cup form permits the use of additional weights being placed therein when the current is of unusual strength, when it is desired to increase the resistance to the escape at the top, or when it is desired to increase the amount of air discharged with the dust through the smaller hole at the bottom of the separating-chamber, as is necessary when the shavings, &c., are discharged through a pipe carried horizontally.

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

1. In combination with a separating-chamber C, having air and dust escape openings at opposite ends, an air-induction pipe formed with a return-elbow A, and an opening B, of constantly-increasing width, leading from the elbow into the chamber, substantially as set forth.

2. In combination with a separating-chamber C, having air and dust escape openings at its opposite ends, an air-induction pipe formed with a return-elbow A, the external and internal walls of which are defined by concentric curves, and an opening B, of constantly-increasing width, leading from the elbow into the chamber adjacently to the wall thereof, substantially as set forth.

3. In combination with the separating-chamber provided with a dust-discharge opening at its lower end, a tubular upward air-discharge and an automatically-adjustable valve supported on a central movable rod guided by upper and lower bearings, substantially as set forth.

4. In combination with the separating-chamber having a dust-discharge opening at its lower end, a tubular upward air-discharge and a cup-formed automatically-adjustable weighted valve supported on a central movable rod guided by upper and lower bearings, substantially as set forth.

5. In combination with the induction-pipe formed with a return-elbow, a discharge-opening therefrom of constantly-increasing width, a separating-chamber with a dust-discharge opening at its smaller end and an air-discharge at its larger end, and an adjustable valve regulating the relative amount of air discharged through the two openings, substantially as set forth.

In testimony whereof I have hereunto subscribed my name in the presence of two attesting witnesses.

WRIGHT D. SMITH.

Witnesses:
R. MASON,
H. E. WHITAKER.