

2,431,336

2 Sheets-Sheet 1

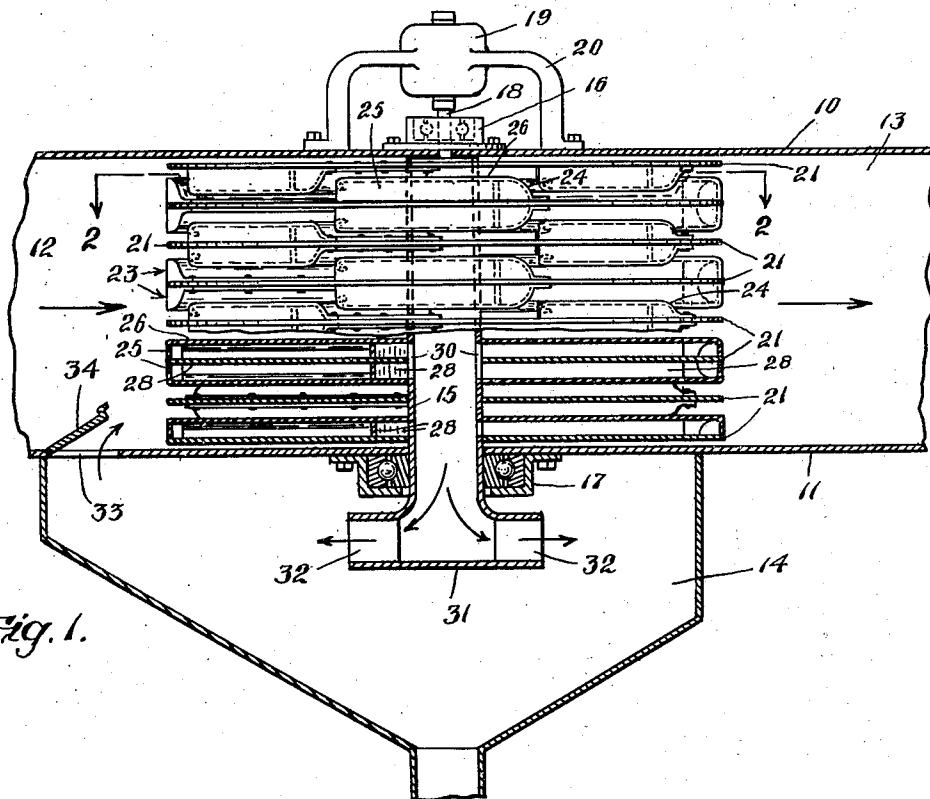


Fig. 1.

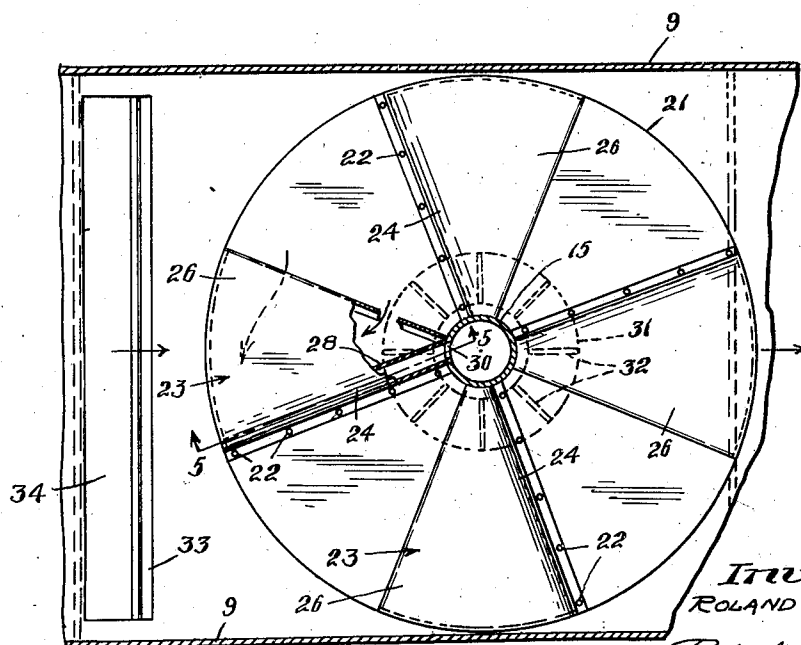


Fig. 2.

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DUST COLLECTOR

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Fig. 3.

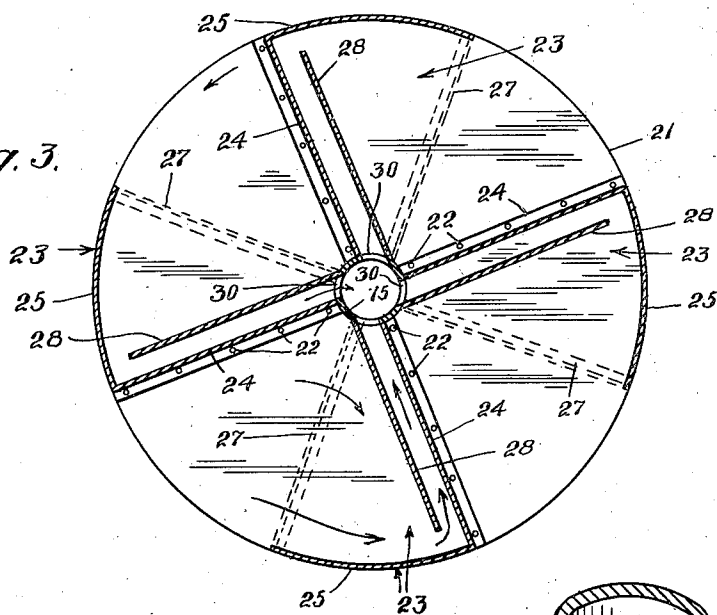


Fig. 4.

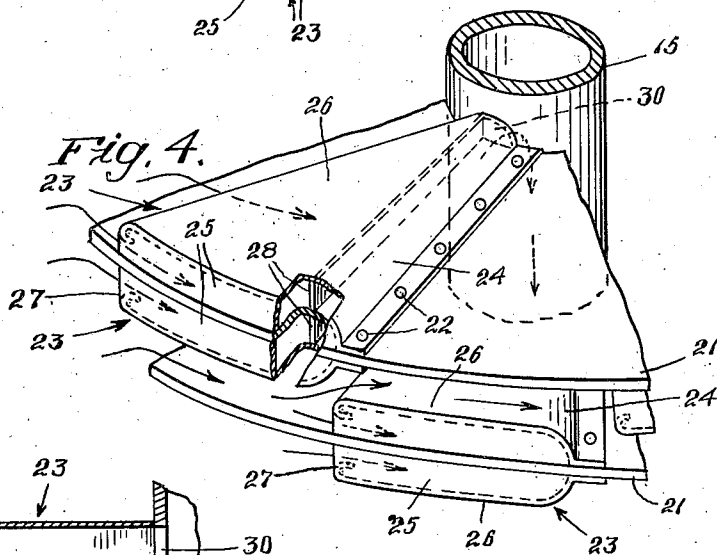
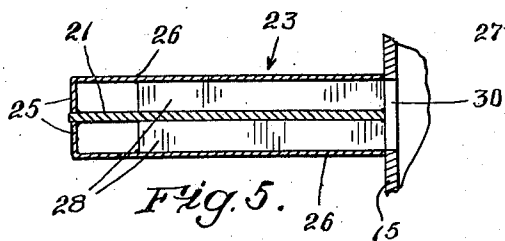


Fig. 5.



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UNITED STATES PATENT OFFICE

2,431,336

DUST COLLECTOR

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2 Claims. (Cl. 183—77)

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This invention relates to collectors for small particles entrained in gas streams, and relates more particularly to dust and cinder collectors.

The usual dust and cinder collectors of the mechanical type use stationary deflectors for causing abrupt changes in the direction of gas flow, or use some mechanism for providing spin in the gas. While such collectors remove a satisfactory percentage of the foreign particles from the gas, they are not satisfactory for all installations for the reason that they offer high resistance to gas flow, and cause in steam power plants, for example, high draft losses. In many existing steam plants where it is desired to install cinder collectors, the forced and induced draft fans do not have the capacity to handle the additional load provided by the usual cinder collectors.

This invention provides a dust and cinder collector which adds no resistance to the system in which it is installed. Spaced deflectors rotate in the gas stream, and accelerate the dust and cause its deflection from the gas, without offering any resistance to the gas flow.

An object of the invention is to reduce the resistance to gas flow of dust and cinder collectors.

Another object of the invention is to collect dust and cinders from a gas stream without adding resistance to the flow of the gas.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a side elevation, in section, of a cinder collector embodying this invention;

Fig. 2 is a sectional view along the lines 2—2 of Fig. 1;

Fig. 3 is a plan view in section, of one of the rotary deflectors of the collector;

Fig. 4 is an enlarged projected view of a portion of one of the rotary deflectors, and

Fig. 5 is a sectional view along the lines 5—5 of Fig. 2.

The collector illustrated has the vertical side walls 9, the upper horizontal wall 10 and the lower horizontal wall 11 forming therebetween the gas inlet 12 and the gas outlet 13. The hopper 14 is suspended below the wall 11.

The hollow hub 15 is supported vertically in the bearing 16 on the upper wall 10, and in the bearing 17 attached to the lower wall 11. The shaft 18 of the electric motor 19 is attached to the hub 15 for rotating same. The motor 19 is attached by the arms 20 to the upper wall 10.

The spaced, horizontal, circular discs 21 are attached to the hub 15, and have attached thereto, as by the rivets 22, the deflectors 23 which

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have the curved, substantially radial portions 24, the outer portions 25 formed as circular arcs, and the side portions 26. The deflectors 23 are thus formed as scoops with open front or upstream ends (with respect to gas flow). With reference to Figs. 3 and 4, the direction of rotation of the discs 21 with their associated deflectors 23, is clockwise, the gas flow with reference to Figs. 1 and 2 being from left to right.

The partitions 28 are spaced from the radial portions 24 of the deflectors 23 and extend outwardly from the hub 15, parallel to the portions 24 but terminate short of the outer ends thereof. The partitions 28 contact the discs 21 and the side portions 26 and portions 24 of the deflectors, and form with same, dust passages which are aligned with the openings 30 in the hub 15.

The lower end of the hub 15 terminates in a conventional centrifugal fan wheel 31 having the spaced, radial blades 32, the hollow interior of the hub 15 forming the inlet passage into the fan wheel 31.

As best illustrated by Figs. 1 and 4, the deflectors 23 attached to one disc 21, are staggered with respect to the deflectors attached to the adjacent disc, by being placed therebetween. The upper side portion 26 of a deflector on one disc, is substantially in alignment with the lower portion 26 of the deflector upstream and of the deflector downstream of same, on the adjacent disc. Thus as illustrated by Fig. 4, the gas passing between the deflectors on adjacent discs is deflected by the staggered deflectors and is caused to move in undulatory paths. The dust particles in the undulatory paths are caused by the changes in direction to flow into the deflectors. The effect is that the entire gas stream is swept by the deflectors.

The lower wall 11 of the collector has the opening 33 communicating with the interior of the hopper 14, and has the pivoted damper 34 for varying the volume of the gas flowing through the opening 33. The opening 33 provides recirculation into the inlet 12, of dust free gas from the hopper 14 as will be described.

In operation the deflectors 23 are rotated by the motor 19 in a clockwise direction with respect to Figs. 2, 3 and 4 of the drawing. The gas flow caused by a fan which is not illustrated moves from left to right with respect to Figs. 1 and 2 of the drawing. The dust laden air intercepted by the open ends 27 of the deflectors 23 passes between the deflector portions 25 and 26 into the interiors of the deflectors. The partitions 28 cause this gas to be deflected outwardly until it

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passes over the outer ends of the partitions into the dust passages connecting with the openings 30 in the hub 15. The fan wheel 31 provides sufficient pressure to cause movement of the dust laden air through the interiors of the deflectors and the hub and into the hopper. The dust falls out into the hopper as the gas is thrown outwardly by the fan wheel 31, and the dust free gas passes through the opening 33 in the wall 11, into the gas inlet 12 for recirculation through the collector. The damper 34 can be adjusted for maintaining the proper gas pressure in the hopper 14.

The dust laden gas passing between the deflectors 23 on adjacent discs 21, is continuously deflected in undulatory paths by the staggered deflectors 23, and on each deflection, since the dust due to its mass and momentum is not deflected as much as the gas is, it is continuously diverted from the undulatory gas streams into the deflectors on both sides thereof. Thus the gas as it passes between the deflectors 23 on the adjacent discs 21 has its entrained dust particles removed so that gas passing out the outlet 13 of the collector is relatively cleaned.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, since modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A dust collector comprising a housing having a gas inlet and an outlet, a hollow hub supported for rotation in said housing between said inlet and outlet, means for rotating said hub, a

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plurality of discs on said hub, and a plurality of deflectors attached to opposite sides of said discs and extending outwardly from said hub, said deflectors having circumferentially extending outer members, having downstream members extending from said hub to said outer members, and having upstream members extending from said hub to closely adjacent said outer members and forming gas inlet openings at said outer members, said upstream and downstream members forming gas passages therebetween extending from said openings to said hub, said hub having openings therein in alignment with said passages.

2. A dust collector according to claim 1 in which some deflectors are so staggered with respect to the deflectors immediately in advance of and in the rear thereof as regards rotary movement that the gas between the deflectors is caused to flow in a plurality of undulatory streams.

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