(No Model.) 2 Sheets—Sheet 1.

H. W. STONE, Jr.

DUST COLLECTOR.

No. 496,015. Patented Apr. 25, 1893.

Fig. 1.

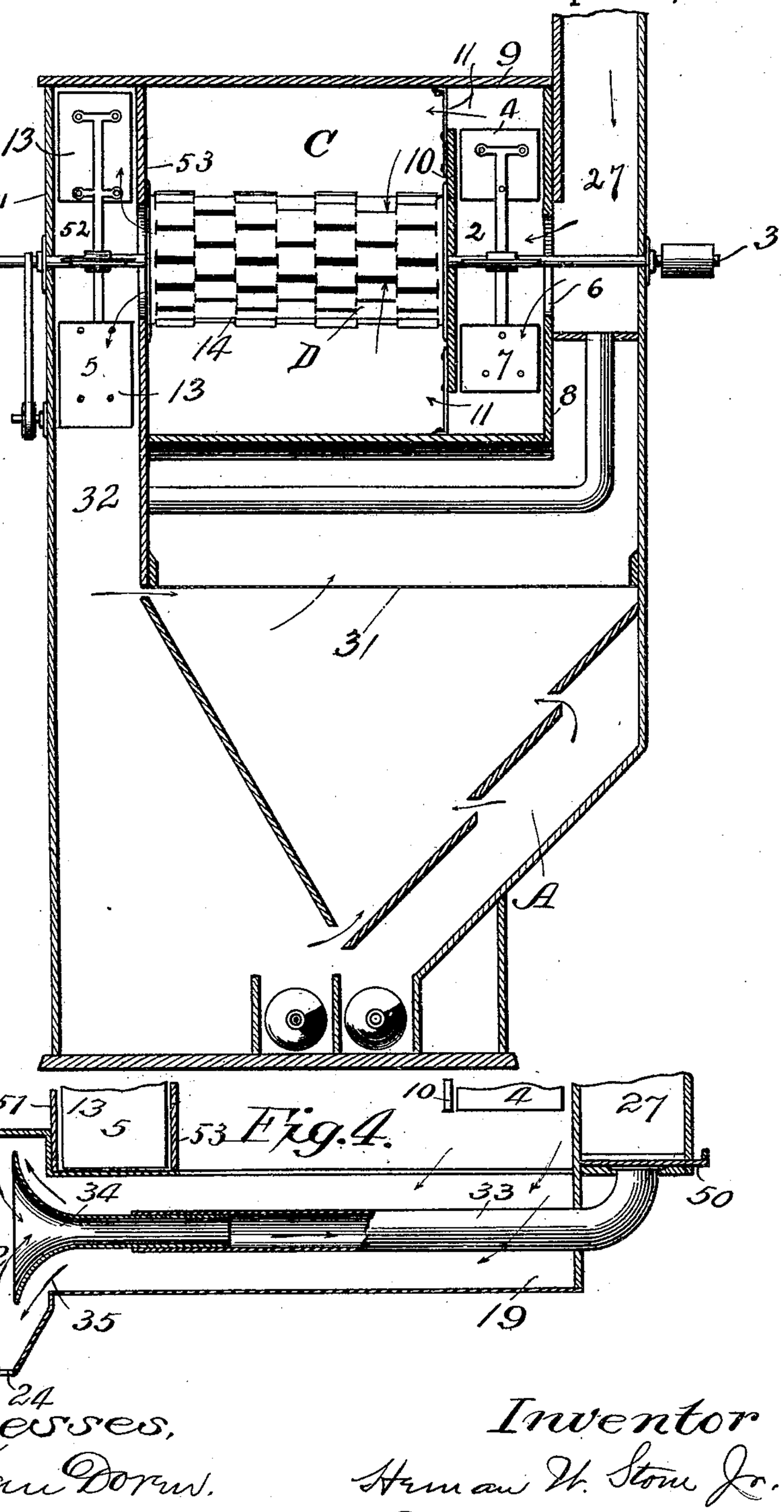

Fig. 4.

Witnesses,
C. E. Van Dorn.
H. S. Johnson.

Inventor
Herman W. Stone Jr.
By Paul & Munn
his Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

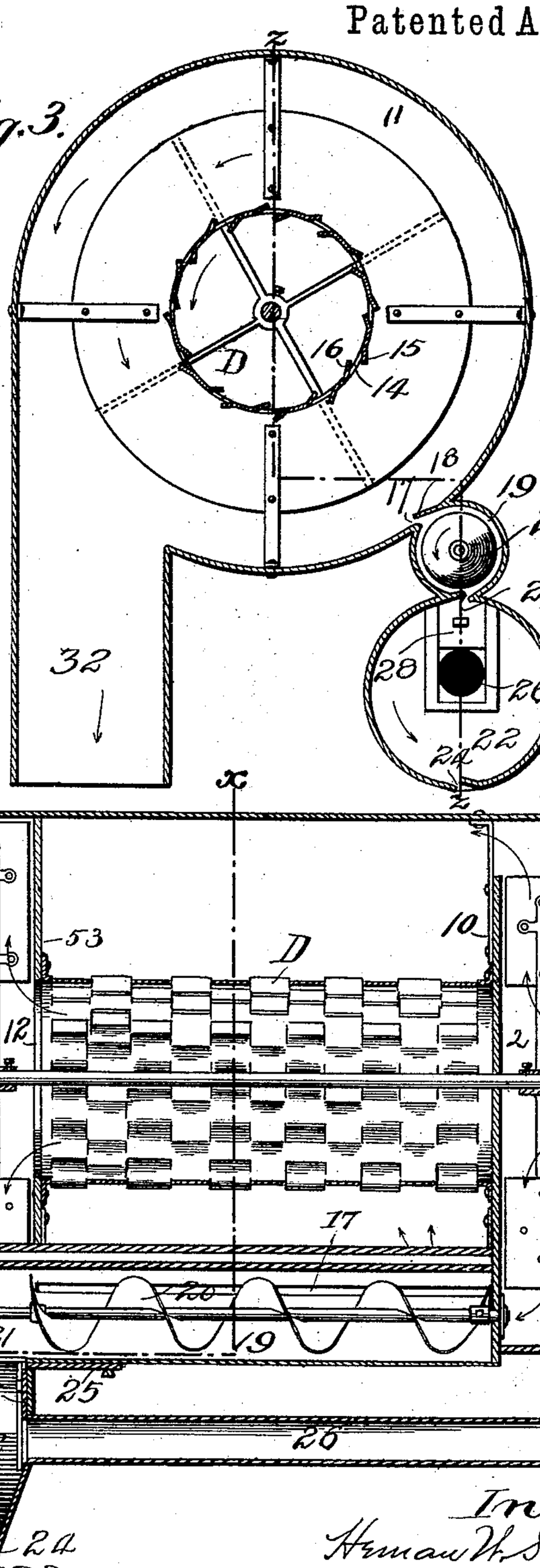

Fig. 2.

Witnesses,
C. E. Van Dorn.
H. S. Johnson.

Inventor,
Herman W. Stone Jr.,
By Paul & Munson
his Attorneys.

UNITED STATES PATENT OFFICE.

HEMAN WARD STONE, JR., OF MORRIS, MINNESOTA.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 496,015, dated April 25, 1893.

Application filed May 2, 1892. Serial No. 431,409. (No model.)

To all whom it may concern:

Be it known that I, HEMAN WARD STONE, Jr., of Morris, Stevens county, Minnesota, have invented certain Improvements in Dust-Collectors, of which the following is a specification.

My invention relates to improvements in dust collecting devices adapted to be arranged as part of a purifier or separator, and consists in certain improved features of construction hereinafter more particularly described and claimed.

In the accompanying drawings forming part of this specification, Figure 1 is a vertical, longitudinal section of my improved collector constructed as part of a purifier. Fig. 2 is a similar view of the dust collector alone; taken on the line Z—Z of Fig. 3. Fig. 3 is a cross section of the same taken on line X—X of Fig. 2, and Fig. 4 is a sectional detail of a modified construction of the auxiliary collector.

In the drawings A represents the separator or purifier, above, and as a part of which, is arranged the dust collector C, having connections establishing a circulating air system through both. The dust collector has a horizontal cylindrical case, through the axis of which extends the driving shaft 3, connected to a suitable source of power, and upon which, within the ends of the case, are mounted the fans 4 and 5. Air is admitted to the case through the circular opening 6 in the end wall 8 around the shaft to the fan chamber 2, in which is arranged the fan 4, the wings 7 of which rotate close to the inner surface of the end wall but do not extend to the cylindrical wall 9. The circular wall or partition 10, approximately equal in diameter to the fan, is arranged parallel with the end wall 8, and concentric therewith, forming a fan chamber between, and leaving an annular space 11 between its edge and the cylindrical wall 9. Similarly at the other end of the case, and constituting with the end wall 51 a fan chamber 52 for the fan 5, is arranged the annular wall 53 having a circular, central opening 12 somewhat larger than the opening 6. The wings 13 of the fan 5 are of larger superficial area than the wings 7, and extend close to the cylindrical wall 9. Arranged in the space between the walls 10 and 53, with its ends secured thereto and concentric therewith, is the open end air cylinder D, provided with series of circumferential openings 14. The lips 15 of these openings are outturned, and the lips 16 are inturned, so as to form air passages or inlets inclined in the direction of the rotation of the fans 4 and 5 in the wall 53, and its open end being closely connected therewith, its interior has free communication with the fan chamber 52, as well as by means of the openings 14, with the interior of the case. Near the bottom of the case, and running lengthwise thereof, between the walls 10 and 53, is arranged the slot 17, having its upper edge or lip 18 inturned so as to form an outlet from the case inclined in the direction of the rotation of the fans. This slot opens into the dust receiving chamber 19, which is preferably a cylindrical case extending the length of the slot 17, and provided with the conveyer 20. At one end of the receiving chamber 19, is arranged the outlet 21, the size of which is regulated by the sliding gate or valve 25, of the same form as the slot 17, but inclined in an opposite direction, so as to form a convenient outlet for the dust laden air rotating in the chamber. This outlet opens into an auxiliary dust collector or chamber 22, substantially cylindrical in form, with the end walls of the lower part 23 constructed, as shown in Fig. 2, and with an outlet 24 at the bottom, inclined in the direction of the rotation of the air entering from the receiving chamber. Arranged parallel with the receiving chamber 19, and with its open end at the axis of the chamber 22, is the pipe 26, leading to the chamber 27 at the end of the dust collector case, which is connected by the opening 6 with the fan chamber 2. The inlet opening to the pipe 26 is controlled by means of the sliding gate or valve 28. In the opposite or outer wall of the chamber 22, is arranged an air outlet 29 controlled by the sliding gate or valve 30.

In some cases I prefer to dispense with the conveyer 20 in the receiving chamber 19, and employ the modified construction shown in detail Fig. 4. Instead of the pipe 26, shown in Fig. 2, I provide the pipe 33, arranged coaxially in the receiving chamber 19, and communicating with the chamber 27. The end next to the chamber 22 is fitted with a funnel

shaped inlet pipe 34, telescoping with it, and which is moved to and fro in it to enlarge or constrict the passage 35 between it and the walls of the chamber 19, thus controlling the outlet from the chamber to the auxiliary collector. At the opposite end of the pipe 33, is a sliding gate 50, for controlling the amount of air passing through it. When this gate is partially or wholly closed, the gate 30 may be opened to provide for a suitable discharge of air at that point.

Operation: The shaft 3 being rotated by the application of suitable power in the direction indicated by the arrows in Fig. 3, the fan 4 draws the air from the chamber 27 through the opening 6, into the fan chamber 2, thence forcing it through the annular opening 11 into the interior of the case. It rotates therein circumferentially at a high speed, the centrifugal force carrying the dust particles of greater specific gravity than the air, outward through the slot 17 into the receiving chamber 19. This operation is assisted by the fan 5, which having greater power than the fan 4, serves to exhaust the air from the case and create a partial vacuum therein, thus increasing the difference between the specific gravity of the air and that of the dust particles, whereby they are more efficiently separated from it, than is the case when the air is of normal gravity, or compressed. The air exhausted from the case passes through the openings 14 in the wall of the cylinder D, thence outward through the open end and the outlet 12, to the fan chamber 52, and thence through the outlet pipe 32, as shown in Fig. 3, or into the purifier as shown in Fig. 1. The dust laden air, as it passes into the chamber 19, has a rotating motion, and the outlet of the chamber being at one end, when the conveyer is not used, this motion is transformed into a spiral motion, thus carrying the dust along the chamber, to its outlet. This is inclined in the direction of the whirling or rotating motion of the air, so as to give it the freest passage, while the funnel, in the construction shown in Fig. 4, tends to deflect it still more. The dust is thus carried into the auxiliary collector with the same whirling or rotating motion, and discharged through the inclined outlet. The partially purified air is taken from the center of the auxiliary collector and conveyed back to the chamber 27 and thence again through the main collector, or the gate 28 may be closed and the purified air discharged through the opening 29, or the air may be allowed to escape in both directions. Where the collector is used as shown in Fig. 1, in connection with a purifier, the air is caused to circulate from the purifier up through its screen 31, and thence to the dust collector, the purified air being conveyed downward from the collector, and into the purifier again.

I claim—

1. In a dust collector, the combination with the cylindrical case, of a cylindrical chamber at each end thereof, a perforate cylinder arranged co-axially in said case and extending from one of said chambers to the other, one of said chambers having an air inlet and an outlet communicating with said case outside of said perforate cylinder, and the other chamber communicating with the interior of said perforate cylinder and having a suitable outlet, a forcing fan in the first chamber and an exhaust fan of greater power in the second chamber, substantially as described.

2. In a device of the class described, the combination with the cylindrical case, of the fan chamber in each end thereof, a central air inlet to one chamber through the end of the case, and an air outlet from the other chamber, an annular opening from the first fan chamber to the interior of the case next its cylindrical wall, the perforate cylinder fixed between the fan chamber with its open end communicating with the second fan chamber, and a fan in each of said chambers, the one in the second chamber being of greater power than the other, substantially as described.

3. In a device of the class described, the combination with the cylindrical case having an inclined, slotted dust outlet near its bottom and longitudinal thereof, the fan chamber in each end thereof, the forcing fan in one chamber, communicating openings between said chambers and the intermediate portion of the case, and the exhaust fan in the other chamber of greater power than the forcing fan, both adapted to carry the air through the case with high rotative velocity, substantially as described.

4. In a device of the class described, the combination with the cylindrical case having a fan chamber at each end communicating therewith, of the fan in one chamber adapted to force the air into said case, and cause it to rotate circumferentially therein with a high velocity, the longitudinal slot in said case having the edges bent so as to form a passage therethrough inclined in the direction of the rotation of said air, the hollow cylinder fixed co-axially in said case, the openings through the walls thereof inclined in the direction of the rotation of said air, and the exhaust fan in the other chamber of greater power than said first fan, substantially as described.

5. In a dust collector, the combination of the perforate cylinder, the inclosing case therefor, the fan chamber in one end having an outlet into said case outside said cylinder, the fan chamber at the other end communicating with the interior of said cylinder, and a fan in each of said chambers, substantially as described.

6. In a dust collector, the combination with the cylindrical case, of a fan chamber in each end thereof, the air inlet in the center of one end of the case communicating with the adjacent chamber, the annular outlet from said chamber adjacent to the side wall of the case, the perforate cylinder fixed co-axially in said

case between said chambers, and communicating with the second chamber, the air outlet from said second chamber, the forcing fan in the first chamber and the more powerful exhaust fan in said second chamber, substantially as described.

7. In a dust collector, the combination with the cylindrical case, of means for forcing the air into said case with a high rotative velocity, a longitudinal slot in said case, having its edges bent to form an outlet inclined in the direction of the rotation of the air in the case, the dust receiving chamber communicating with said opening and provided with a valve controlled outlet, an auxiliary dust collector communicating with said outlet, and an air pipe communicating with said auxiliary collector, and with the inlet to said case, substantially as described.

8. In a device of the class described, the combination with the main dust collector and a dust receiving chamber connected therewith, of the auxiliary dust collector having valve controlled communication with said dust receiving chamber, a peripheral dust outlet, and an air outlet pipe connecting said auxiliary collector with said main collector, substantially as described.

9. The combination with the cylindrical dust collector having a slotted dust outlet longitudinal thereof, of the cylindrical dust receiving chamber parallel and communicating therewith by means of said dust outlet, and an auxiliary collector at one end thereof having a peripheral dust outlet, and an axial air outlet, substantially as described.

10. The combination with the cylindrical dust collector having a slotted dust outlet longitudinal thereof, of a cylindrical receiving chamber parallel and communicating therewith by means of said slot, an auxiliary collector at one end of said receiving chamber having a peripheral dust outlet, and an axial air outlet, and a pipe connecting said outlet with the inlet to the main collector, substantially as described.

11. The combination with the cylindrical dust collector having a longitudinally slotted dust outlet, of the receiving chamber parallel with said collector and communicating therewith by means of said outlet, the auxiliary dust collector at one end of said receiving chamber, but of greater diameter, having a peripheral dust outlet, the air outlet pipe arranged axially in said receiving chamber and communicating with said auxiliary dust collector, and leading to the inlet to the main collector, and means for regulating the size of the opening between said receiving chamber and said auxiliary dust collector, substantially as described.

In testimony whereof I have hereunto set my hand.

HEMAN WARD STONE, JR.

In presence of—
L. F. STONE,
O. W. FINNEY.