March 6, 1951 G. C. POLK 2,544,395

DUST COLLECTOR

Filed March 30, 1948 2 Sheets-Sheet 1

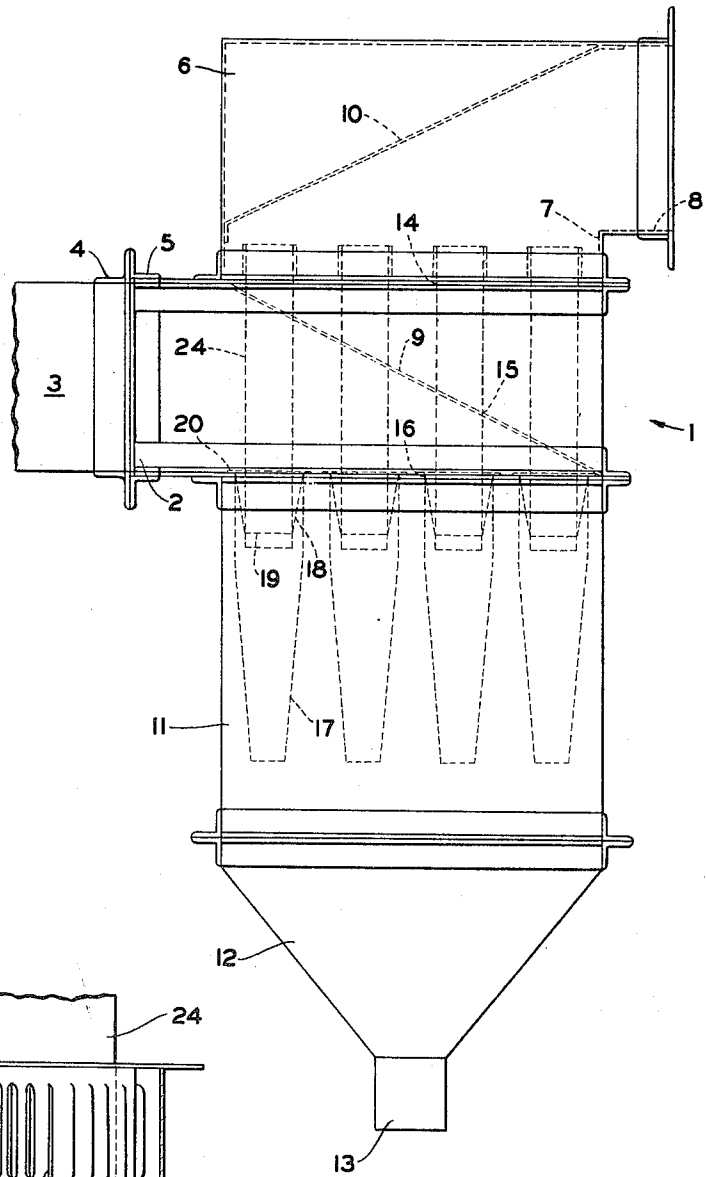

FIG. 1

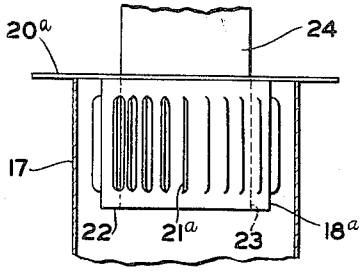

FIG. 5

INVENTOR.
Gilbert C. Polk
BY
Andrew K. Foulds
his ATTORNEY

March 6, 1951 G. C. POLK 2,544,395

DUST COLLECTOR

Filed March 30, 1948 2 Sheets-Sheet 2

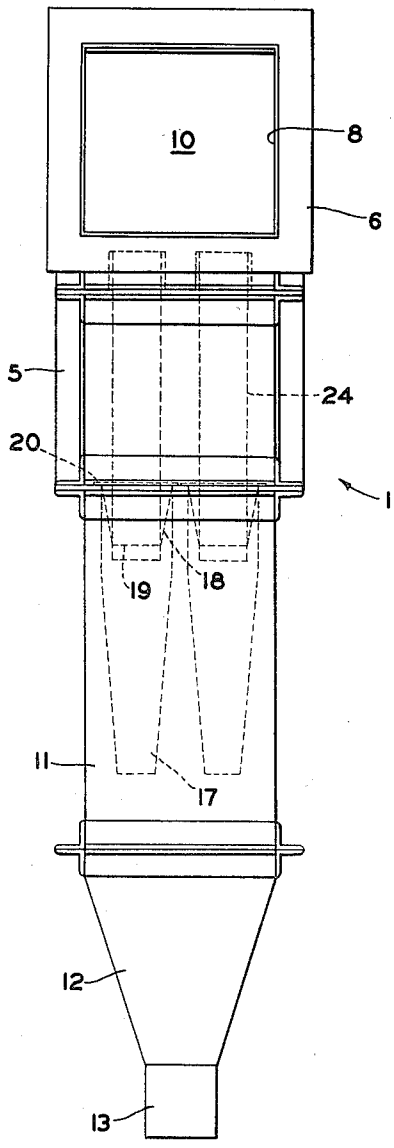

FIG. 2

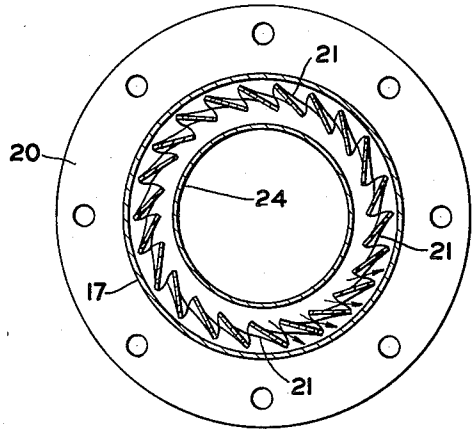

FIG. 4

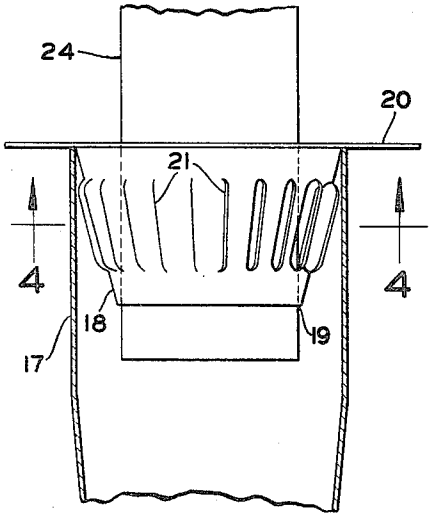

FIG. 3

INVENTOR.
Gilbert C. Polk
BY
Andrew K Foulds
his ATTORNEY

Patented Mar. 6, 1951

2,544,395

UNITED STATES PATENT OFFICE

2,544,395

DUST COLLECTOR

Gilbert C. Polk, Detroit, Mich., assignor to American Blower Corporation, Dearborn, Mich., a corporation of Delaware

Application March 30, 1948, Serial No. 18,020

6 Claims. (Cl. 183—81)

1

This invention relates to new and useful improvements in dust collectors.

One of the objects of this invention is to provide a new and improved dust collector.

Another object is to provide an improved means for imparting a rotary motion to a dust-laden gas for separation of particles therefrom.

Another object is to provide a more efficient dust collector assembly which is simple to manufacture and easy to operate.

Other objects will become apparent from time to time throughout the specification and claims as hereinafter related.

This invention comprises the new and improved construction and combination of parts, to be described more fully hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, there are clearly and fully illustrated two preferred embodiments of this invention, in which drawings:

Figure 1 is a side view, in elevation, of a dust collector unit embodying one form of this invention,

Fig. 2 is an end view, in elevation, of the unit shown in Fig. 1,

Fig. 3 is a sectional view of one of the collector conduits shown dotted in Figures 1 and 2 and showing the novel gas spinner member and outlet conduit in elevation,

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3, and

Fig. 5 is a view similar to Fig. 3 and showing an alternate form of spinner member.

Referring to the drawings by characters of reference, there is shown a dust collector unit comprising a rectangular closed casing 1 having an open end 2 joined to a rectangular inlet conduit 3 by flanges 4 and 5 respectively on the inlet conduit and casing. Positioned above and carried by the casing 1 is an outlet conduit member in the shape of a rectangular casing 6 having open bottom and end walls 7 and 8 respectively. Within the casing 1 there is an inclined or diagonal wall 9 which extends diagonally from the upper wall of the casing 1 adjacent the inlet to the lower wall of the casing at the closed end thereof. In the outlet casing conduit 6 there is a diagonal wall 10 which extends from the lower part of the closed end wall to a point on the upper wall adjacent the outlet end 8.

Secured to the lower wall of the casing 1 there is a rectangular casing-like conduit member 11 which has open top and bottom portions and

2

which is secured to at its bottom portion and opens into a pyramidal shaped hopper 12, the hopper 12 having an outlet 13.

In each of the top, diagonal, and bottom walls of the casing 1 there are a plurality of holes or apertures 14, 15, and 16 respectively which are alined vertically. Extending downward into the casing conduit 11 from each of the apertures 16 in the lower wall of the casing 1 and secured in the apertures 16 are a plurality of collector conduits 17 which are substantially cylindrical at their upper ends and taper conically toward their lower ends. In each of the conduits 17 at their upper or inlet ends there is positioned a gas rotating spinner member 18. The spinner members 18 are each in the shape of a right truncated cone formed or otherwise manufactured of sheet material and having an open apex 19 and a flange 20 around the base. Substantially along elements of the spinner 18 are a plurality of substantially equally spaced slots. The material between adjacent slots is twisted outward along one slot and inward along the adjacent one so as to form a plurality of vaned apertures 21. In the alternate form of spinner member, shown in Fig. 5, the spinner 18^a is in the shape of a right cylinder and has an out-turned flange 20^a around its base and an in-turned flange 22 enclosing an aperture 23 at its lower end. The vaned apertures 21^a are formed in the manner described for the conical spinner member 18.

There are a plurality of outlet conduits carried by the upper wall of the casing 1 and extending, one for each, downwardly through the alined apertures 14 and 15 and through or to the open apex 19 or aperture 23 of the spinner members 18 or 18^a. It should be noted that the spinner members 18 or 18^a close the annular inlet opening to the collector conduits 17 and fit at their lower end portions around the outlet conduits 24.

In operation this collector unit functions as follows:

A dust or particle-laden gas is conducted into the casing 1 through the inlet conduit 3 and directed by the diagonal or inclined wall 9 downward through the spinner members 18 or 18^a, the inclined wall 9 tending to equalize the distribution of gas to the spinner members 18 or 18^a. In passing through the spinner members 18 or 18^a the particle-laden gas is given a rotary motion by the vaned apertures 21 or 21^a and ejected outward and downward in a plurality of sheet-like streams in spiral and conical or cylindrical paths directed circumferentially of and by the

walls of the collector conduit 17. Since the particle-laden gas stream is discharged into the annular space between the walls of the collector conduit and the spinner member, the gas stream path as a whole is in the form of a hollow rotating cylinder. This rotary motion causes the particles in the gas to concentrate in the outermost layer adjacent the walls of the collector conduit and thereby to provide a clean central portion of rotating gas. This clean central portion of gas is conducted upward through the outlet conduits 24 and the outlet casing conduit 6, the clean gases being directed out of the outlet 8 by the inclined wall 10. The concentrated particles along the walls of the collector conduits 17 fall by gravity into the hopper 12 from which they are discharged through the hopper outlet 13 into a container (not shown).

It should be noted that there have been collector units of this general type in the past which utilized rotation of a gas stream to separate particles therefrom and to discharge cleaned gas through an outlet conduit similar to the arrangement shown herein. However, in this collector unit, by the use of the spinner members 18 or 18a which close the the inlet to the collector conduit and which extend downward into the inlet so that gas is discharged directly against the collector conduit walls, the particles in the gas are thrown directly outward without passing through a central turbulent air stream portion which is characteristic of older type collectors. The present construction results in a shorter distance of travel for the particles to concentrate for collection since the conical or cylindrical and spiral sheet-like path of gas stream discharge permits the gas stream portions from the lower or innermost portion of the spinner members to reach the walls of the collector conduit without passing through the upper or outer layers with the result that a much more efficient separation is accomplished.

Having thus fully described the invention, what is claimed and desired to be secured by Letters Patent of the United States is:

1. In a dust collector, a collector conduit, an outlet conduit extending into the inlet end of said collector conduit and being of smaller diameter than said collector conduit, a hollow spinner member having the shape of a right truncated cone having its base portion closing the inlet end of said collector conduit and extending into said inlet end with its apex fitting around the wall of said outlet conduit, and said spinner member having a plurality of apertures through its conical wall arranged circumferentially around and extending longitudinally of said wall, and means cooperable with said apertures to direct gas passing therethrough into said collector conduit with a motion circumferentially thereof.

2. In a dust collector, a collector conduit, an outlet conduit extending into the inlet end of said collector conduit and being of smaller diameter than said collector conduit, a hollow spinner member having the shape of a cylinder having a closed end wall with an aperture concentrically positioned therein and having an annular flange around the open end thereof, said member extending into the end of said collector conduit and having said outlet conduit extending through said aperture, said flange being operable to close the inlet to said collector conduit and to space said member in said conduit inlet end, and said spinner member having a plurality of apertures so constructed and arranged as to discharge gas passing therethrough into said collector conduit with a motion circumferentially thereof.

3. A dust collector unit comprising a rectangular closed casing having upper and lower walls and having an open end providing an inlet, an internal wall extending diagonally from the upper wall at a point adjacent said open end to the lower wall at the other end of said casing, a plurality of apertures in each of the upper, internal, and lower walls and alined vertically, a casing-like conduit member having open upper and lower ends, said conduit member having its upper end secured to the lower wall of said casing and having its lower end secured to and opening into a pyramidal shaped hopper, an outlet casing-like conduit member having open lower and end wall portions and secured at its lower wall portion to the upper wall portion of said casing; a plurality of collector conduits extending downward, one for each, from said plurality of casing lower wall apertures and secured at their inlet portions in said lower wall apertures; a plurality of spinner members one in each of said collector conduits, each of said spinner members comprising a hollow truncated cone having a flange around its base and having its apex portion extending downward into the inlet of its respective collector conduit, said spinner members each having a plurality of slots substantially along elements thereof and having the metal between adjacent slots twisted outward along one slot and inward along the adjacent slot so as to form vanes directed substantially circumferentially of said collector conduit, and a plurality of outlet conduits carried at their upper end portions by said casing upper wall and extending downwardly through and fitting the alined apertures of said upper and internal walls and extending one into each of the collector conduits and through and fitting the open apex portion of each of said spinner members.

4. In a separator, a collector conduit having an inlet end portion, an outlet conduit having an inlet end portion extending into said collector conduit inlet end portion in radially spaced concentric relation thereto, a hollow tubular spinner member positioned within said collector conduit portion in surrounding relation to said outlet conduit portion and being radially spaced intermediate its ends from said conduits, said spinner member having its inlet end portion connected to said collector conduit portion and having its other end portion connected to said outlet conduit portion, said spinner member having a surrounding series of slots therethrough extending as elements thereof, the portions of said member between said slots being inclined to the wall of said member to guide fluid on its passage through said slots.

5. In a separator, a collector conduit having an inlet end portion, an outlet conduit having an inlet end portion extending into said collector conduit inlet end portion in radially spaced concentric relation thereto, a hollow truncated conical spinner member positioned within said collector conduit portion in surrounding relation to said outlet conduit portion and being radially spaced intermediate its ends from said conduits, said spinner member having its base portion connected to said collector conduit portion and having its apex portion connected to said outlet conduit portion, said spinner member having a surrounding series of slots therethrough extending as elements

thereof, the portions of said member between said slots projecting from the opposite faces of the wall of said member to guide fluid on its passage through said slots.

6. In a separator, a collector conduit having an inlet end portion, an outlet conduit having an inlet end portion extending into said collector conduit inlet end portion in radially spaced concentric relation thereto, a hollow tubular spinner member positioned within said collector conduit portion in surrounding relation to said outlet conduit portion and being radially spaced intermediate its ends from said conduits, said spinner member having annular end flanges connected respectively to said collector conduit portion and to said outlet conduit portion, said spinner member having a surrounding series of slots therethrough extending as elements thereof, the portions of said member between said slots being inclined to the wall of said member to guide fluid on its passage through said slots.

GILBERT C. POLK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
385,037	Ash	June 26, 1888
415,368	Rietz	Nov. 19, 1889
435,165	Ash	Aug. 26, 1890
715,649	Engel	Dec. 9, 1902
1,684,021	Hawley	Sept. 11, 1928
1,684,023	Hawley	Sept. 11, 1928
1,909,184	Lissman	May 16, 1933

FOREIGN PATENTS

Number	Country	Date
642,547	Germany	Mar. 8, 1937