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FREDERICK A. WEGNER, OF SILVER CREEK, NEW YORK.

DUST-COLLECTOR.

1,281,238.

Specification of Letters Patent.

Patented Oct. 8, 1918.

Application filed April 22, 1916. Serial No. 92,892.

To all whom it may concern:

Be it known that I, FREDERICK A. WEGNER, a citizen of the United States, residing at Silver Creek, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Dust-Collectors, of which the following is a specification.

This invention relates to dust collectors in which dust or other matter held in suspension in air is separated therefrom by the rapid whirling of the laden air in a separating chamber.

The invention subject of the present application is in the nature of improvements upon the invention subject of an application filed by me March 2, 1916, Serial Number 81,695, and the broad objects of the present invention are the same as the objects of the application referred to, these objects being to provide a machine of the character specified in which entrance of dust laden air into the air outlet is practically eliminated, and the separating action is rendered thoroughly effective.

In successful machines of the character specified, the laden air under pressure, generally by means of a fan, is introduced tangentially into one side of the separating chamber and travels in a circular path in contact with the walls of the chamber, until nearly a complete revolution is made, when the air from the tangential entrance is encountered which acts as a barrier to the further true circular travel in the same plane and the natural force of gravity also acts to cause the current of laden air to drop lower into the chamber. Under these influences, the current of air whirling around in the chamber tends, when, at the end of the first complete revolution, it encounters the incoming air at the entrance as stated, to pass around partially below the first circle of air, and the continued whirling of the air gradually passes to lower planes thereby forming a whirl or vortex of such air, of substantially the form of an inverted cone.

Owing to the obstruction of the current at the entrance the vortex or cone of whirling air is forced somewhat laterally, so that its axis becomes eccentric to that of the chamber and if the discharge outlet for the purified air is central, or concentric with the axis of the chamber, the function of separating

will be interfered with by the encounter of the air of the eccentric vortex with the concentric walls of the air outlet.

It is therefore necessary that means be provided for causing the axis of the air outlet to register with the axis of the vortex of whirling air.

Many unsuccessful or only partially successful efforts have been made to accomplish this object, and means for doing this are shown in the former application referred to.

The principal specific object of the present invention is to improve upon the means for making the two axes coincide and the further objects are to improve the construction and operation of other parts of the machine.

To carry out these objects, the present invention consists in the improved construction, arrangement and combination of the parts of a dust collector of the character which will be hereinafter fully described and afterward claimed.

In order that the construction and operation thereof may be readily comprehended, I have illustrated an approved embodiment of my invention in the accompanying drawings, and will now proceed to fully and specifically describe the same in connection with said drawings, in which—

Figure 1 represents a central vertical sectional view;

Fig. 2, a top plan view; and

Fig. 3, a top plan view, with parts removed.

Like reference characters mark the same parts in all of the figures of the drawings.

Referring specifically to the drawings, A denotes a separating chamber, which comprises the usual upper cylindrical portion 1, and a lower or tapered conical portion 2, terminating at its lower end in the dust discharge opening 3. The upper cylindrical portion is provided with the usual tangential inlet passage 4 for the dust laden air, and 5 indicates the usual tubular guard or exhaust air escape.

It may be noted in connection with the general structure of the dust collector herein shown, although the same forms no part of the present invention, that the conical portion 2 of the separating chamber is of comparatively great length and small in diameter, being shaped like a long slender frustum of a cone, and has a relatively small

dust discharge opening located at the smaller end of the separating chamber. The wall of the separating chamber is preferably shaped like the surface of an inverted cone, the altitude of which is substantially three times the diameter of its base, it being found that a separating chamber proportioned in this manner gives better results and attains better separation, in which event the air leaving the collector is much more free from fine dust than in separators having the conical part of the separating chamber of different proportions.

The top or deck of the collector is of special construction, comprising an outer sheet metal portion 6, a superposed sectional cast iron strengthening member 7, and an inner circular plate 8, arranged concentric with the collector and serving to support the tubular guard which projects downwardly within the casing or separating chamber. The outer portion 6 is secured in any suitable manner to the upper edge of the cylindrical part of the collector, but preferably by a seam joint, such as shown at 9 in Fig. 1 of the drawings, said outer portion having an opening therein concentrically disposed relative to the axis of the collector. The strengthening member 7 which is in the form of a flat sectional ring is made preferably in four parts, as shown, having upstanding flanges 10, which are bolted together as indicated at 11, and this member is riveted or otherwise secured to the outer sheet metal portion 6, the inner diameter of said sectional ring being slightly larger than the opening formed in said outer top portion, thus providing a supporting ledge upon which the circular plate 8 is adapted to rest, it being understood that said circular plate is of a diameter slightly less than the inner diameter of the sectional ring 7 within which it fits. It is, therefore, to be noted that the circular plate 8 neatly fits within the sectional ring 7, and is arranged in the same horizontal plane therewith, being supported upon the annular ledge 12, formed by extending the inner edge of the outer top portion 6 a slight distance inward beyond the inner edge of the sectional ring 7.

The circular plate 8 is provided with an elongated or elliptical opening 13 within the limits of which is located the axis of the separating chamber, and a plate 14 provided with a circular opening, the diameter of which is equal to the minor diameter of the elliptical opening in the plate 8, is mounted on the top of the plate 8 and is slidable thereon in order to bring the circular opening into register with any part of the elliptical opening from end to end thereof, said plate 14 being sufficiently large to overlap the edges of the plate 8 around the elliptical opening in every position to which the plate 14 may be adjusted. Said plate 14

is guided on the plate 8 by means of parallel bars 15 mounted on said plate 8 alongside of but at a short distance from the longer sides of the elliptical opening 13, and is held down upon the plate 13 by means of clamping plates 16 through which pass screws 17 into said parallel bars 15.

The tubular guard or air exhaust 5, comprises two sections, the section 5^a being located above the top of the separating chamber and the section 5^b below the top of said chamber and projecting into the inner portion thereof. The lower or inner section 5^b is mounted in the circular opening of the plate 14 by any suitable means, there being shown in this instance a bead 18 projecting upwardly around the section 5^b near the top thereof, upon which bead said plate 14 rests and to which it is rigidly secured by a flange 19 turned upwardly around the top of said section 5^b.

The section 5^a which extends above the top of the separating chamber is provided at its lower end with a flange 20 which rests upon the flange 19 of the section 5^b, and a bead 21, between which and said flange is held a circular ring 22. Between said ring 22 and the plate 14 is a suitable packing 23 to prevent the escape of air and said plate carrying the upper section 5^a of the tubular guard, is pressed downward upon said packing by means of clamping plates 24 through which screws 25 pass into plate 14.

The air escape from the dust collector also whirls at a high velocity so that a small part of the separation takes place in the air escape opening, or tubular guard, and in order to prevent small quantities of dust, which may find their way into the tubular guard, from passing out with the purified air, I provide an inverted frusto-conical member 27 in the upper section of the tubular guard, which, with the walls of said guard, forms an auxiliary dust chamber 28 for receiving any dust particles which may be thrown against the walls of the tubular guard by the whirling action of the air therein. This member 27 is secured at its upper end within a bead 29 formed in the upper section 5^a of the tubular guard, and from thence extends downwardly and inwardly within said guard and at its lower end is provided with an outwardly extending circular flange 30 as clearly shown in Fig. 1.

The dust collected in this chamber 28 is conveyed therefrom through a tube 31 leading from the side of said chamber and under ordinary circumstances would be discharged at any suitable or convenient point, usually a dust box outside the collector. In this instance, however, I carry this tube downwardly on the outside of the collector and enter it through the side of the collector at a point in its conical portion, as at 32, the lower end of the tube, as at 33, being located

centrally in the collector to discharge downwardly and out therefrom and thus serve to keep the dust outlet free from dust and effectually prevent the updraft within the collector. To regulate the force of the air passing through this tube a valve 34 is provided therein just outside of the collector, and to adjust the lower discharge end of the tube nearer to or farther from the dust outlet 3, a telescoping end piece of tubing is fitted on the lower end of the tube in the chamber and adjusted as indicated in dotted lines in Fig. 1, and which is held in adjusted position by a set screw 36.

15 In order to facilitate the attachment and removal of the tube 31 from the tubular guard 5, an elbow 37 is provided therein which is turnable on the upper end of the tube and removable from a branch 38 as shown in Fig. 1.

20 Extending transversely across this frusto-conical member 27 is a supporting bar 30 which is bolted or otherwise secured thereto as shown and carries a vertical rod 40 centrally arranged within the tubular guard, which forms a shaft upon which agitator arms 41 are journaled, said arms extending horizontally in opposite directions from a hub 42 journaled on the lower end of the rod 40 at a point slightly below the frusto-conical member 27, and bent upwardly at their free ends at right angles to their horizontal portions, extending into the auxiliary dust chamber. A plate 43 is secured to the horizontal portion of the agitator arms in any suitable manner and serves as a means against which the whirling air, as it passes through the tubular guard, may impinge to cause the rotation of the agitators, whereby dust is prevented from settling in the auxiliary chamber to the detriment of the successful operation of the collector.

45 The centrifugal force causes the dust to travel through the whirling air to the outside of the vortex causing the particles of material heavier than air to be carried toward the walls of the chamber against which the outside of the vortex travels.

50 When the material to be separated from the laden air is of a very light character, such for instance as pulverized talc or talcum powder, the body of the separating chamber, which is usually cylindrical, is made longer or taller than when the material is heavier, so as to permit of a larger number of revolutions of the air in the body before the vortex is narrowed by passing into the conical portion of the separator.

60 To control this air in the cylinder I provide an extensible air outlet by inserting a telescoping tube 44 in the lower section 5^b of the tubular guard. In this telescoping tube I provide a cross bar 45, with a hub 46 to which the rod 40 is threaded and by means of a suitable handle 47 said rod may

be turned in said hub, causing the telescoping tube 44 to be raised and lowered to lengthen the tubular guard.

I deem it preferable that the proportions of the lower section 5^b of the tubular guard 70 and the telescoping tube 44 be such that said tube 44 in its lowest adjustment, will project slightly into the conical portion 2 of the separating chamber.

75 By the adjustment of the plate 14 on the plate 8 longitudinally of the oblong or elliptical opening 13, the axis of the tubular guard or air escape may be adjusted radially with relation to the axis of the separating chamber, and may be secured in such adjusted position. To change the direction of this radial adjustment, the plate 14 may be adjusted circularly, and by means of these two adjustments the axis of the tubular guard may be brought to any part within 85 a circle having for its diameter the distance between the two centers of the oblong, or elliptical opening, to conform to the axis of the vortex of the whirling air.

90 While I have specifically described the construction and location of the various illustrated component parts of my invention, it will be understood that changes and variations may be made therein without departing from the spirit and scope of the invention as hereinafter claimed.

95 What I claim as new and desire to secure by Letters Patent of the United States, is—

1. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck and a tubular guard diametrically adjustable in said circularly adjustable plate.

2. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck, a plate diametrically adjustable on said circularly adjustable plate and a tubular guard carried by the diametrically adjustable plate.

3. In a dust collector, the combination with a separating chamber, and a deck or top therefor, of a plate circularly adjustable on the deck and having an oblong opening, and a tubular guard diametrically adjustable in said opening.

4. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck and having parallel guide bars on its upper face, and a tubular guard adjustable between said guide bars.

5. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck and having an oblong opening, parallel guide bars along the longer sides of said opening, and a tubular guard adjustable between said bars.

6. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck and having an oblong opening, parallel guide bars along the longer sides of said opening, a plate mounted over the oblong opening and diametrically adjustable on the circularly adjustable plate, between said guide bars, and a tubular guard carried by said diametrically adjustable plate. 5
7. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck and having an oblong opening, parallel guide bars along the longer sides of said opening, a plate mounted over the oblong opening and diametrically adjustable on the circularly adjustable plate, between said guide bars, and provided with a circular opening, and a tubular guard carried in said circular opening. 10
8. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck, and a tubular guard diametrically adjustable in said circularly adjustable plate and provided with an extensible lower end. 15
9. In a dust collector, the combination with a separating chamber and a deck or top therefor, of a plate circularly adjustable on the deck, a plate diametrically adjustable on said circularly adjustable plate, and a tubular guard carried by the diametrically adjustable plate and provided with an extensible lower end. 20
10. In a dust collector, the combination of a separating chamber having an inlet opening and discharge openings for air and dust, a tubular guard, a member secured within the guard and forming with the walls of said guard an annular dust chamber, and a tube leading from said dust chamber, discharging within the collector below the deck and having an extensible lower end. 25
11. In a dust collector, the combination of a separating chamber having an inlet opening and discharge openings for air and dust, a tubular guard, an auxiliary dust chamber within said guard, and a tube leading from said auxiliary chamber and discharging within the collector at a point near the lower end thereof, and provided with an extensible lower end. 30
12. In a dust collector, the combination of a separating chamber having an inlet opening and discharge openings for air and dust, a tubular guard, an auxiliary dust chamber within said guard, and a tube removably connected with said chamber, discharging within the collector at a point near the lower end thereof and provided with an extensible lower end. 35
13. In a dust collector, the combination of a separating chamber having an inlet opening and discharge openings for air and dust, a tubular guard, an auxiliary dust chamber within said guard, and a tube leading from said chamber to a point without the collector, and then entering the collector, and discharging in a downward direction at a point near the dust discharge outlet, the lower extremity of said tube being adjustable. 40
14. In a dust collector, the combination of a separating chamber having an inlet opening and discharge openings for air and dust, a tubular guard, an auxiliary dust chamber within said guard, a tube leading from said chamber to a point without the collector, then entering the collector and discharging in a downward direction at a point near the lower end thereof, and a regulating valve in said tube, said tube being removably connected to the auxiliary dust chamber and provided with an extensible lower end. 45
15. In a dust collector the combination of a separating chamber, and a deck therefor comprising an outer ring secured on the upper edge of the walls of the chamber and projecting inwardly, a strengthening ring mounted on said outer ring and terminating with its inner edge a short distance from the inner edge of the outer ring, leaving the inner edge of the outer ring projecting inward, as a ledge, a circular adjustable ring provided with an oblong opening, and having its outer edge resting on said ledge, a tubular guard mounted in said oblong opening and adjustable diametrically of the chamber, and means for securing the parts in their several adjustments. 50
16. In a dust collector the combination of a separating chamber, and a deck therefor comprising an outer ring secured on the upper edge of the walls of the chamber and projecting inwardly, a strengthening ring mounted on said outer ring and terminating with its inner edge a short distance from the inner edge of the outer ring, leaving the inner edge of the outer ring projecting inward, as a ledge, a circular adjustable ring provided with an oblong opening, and having its outer edge resting on said ledge, a plate mounted upon the circular adjustable plate provided with a circular opening and adjustable longitudinally with relation to the oblong opening, a tubular guard mounted in the circular opening of the last named plate, and adjustable therewith longitudinally of the oblong opening, and means for securing the plates in their various adjustments. 55
17. In a dust collector, the combination of a separating chamber having an inlet opening and discharge openings for air and dust, a tubular guard, a member secured within the guard and forming with the wall of said guard an annular chamber, and a tube leading from said chamber and 60

discharging within the separating chamber at a point near the lower end thereof, said tube having an extensible section at its discharge end.

- 8 18. In a dust collector, the combination of a separating chamber, an air discharge for said separating chamber, a tube associated with said air discharge for returning a portion of the air passing there-
10 through to the separating chamber, and an extensible section upon the discharge end of said tube.

19. In a dust collector, the combination of a separating chamber, an air discharge for said separating chamber, a tube asso- 15
ciated with said air discharge for returning a portion of the air passing therethrough to the separating chamber, said tube discharg-
ing in a downward direction within said separating chamber, and an extensible sec- 20
tion upon the discharge end of said tube.

In testimony whereof I affix my signature.

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P134

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2 SHEETS—SHEET 1.

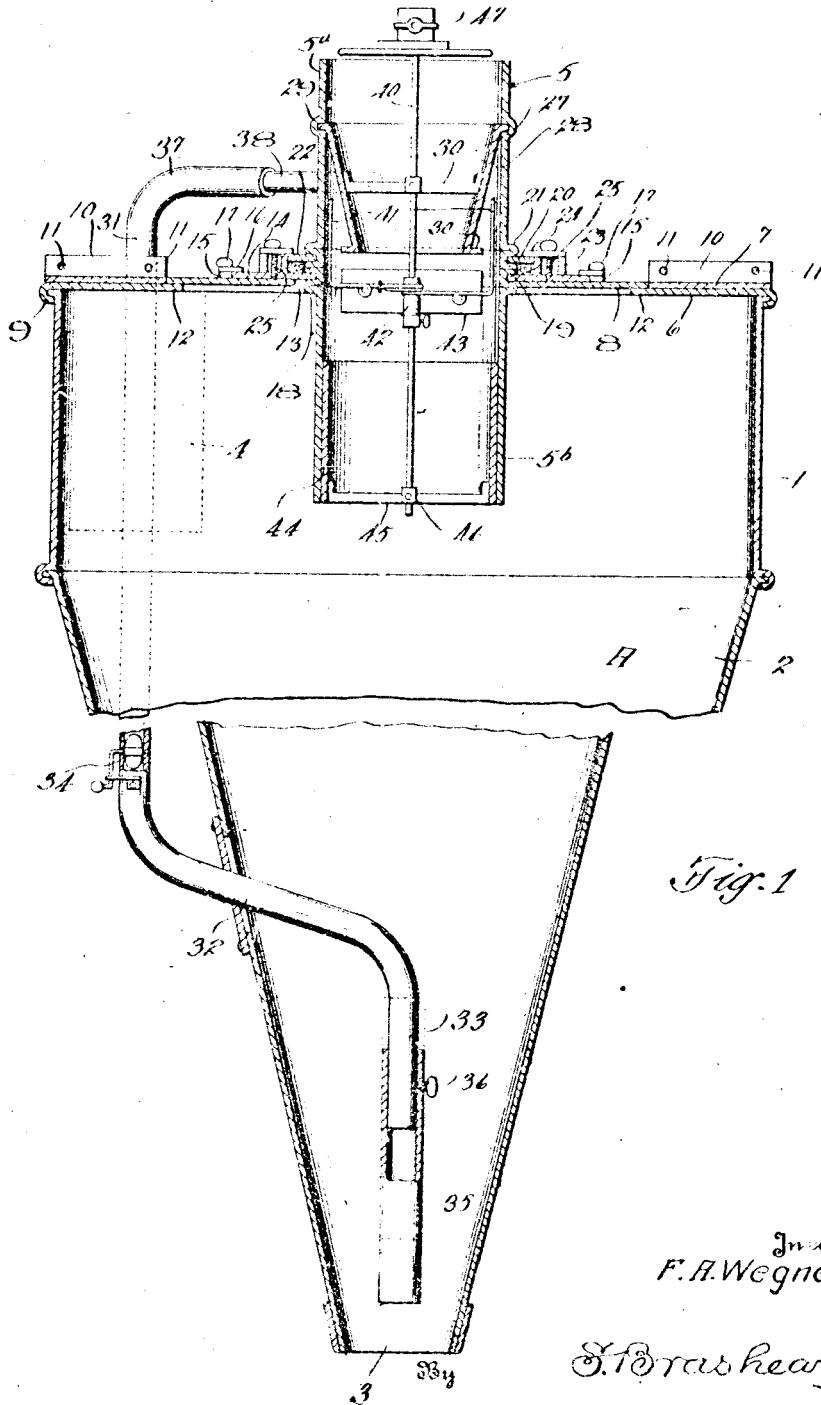


Fig. 1

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2 SHEETS—SHEET 2.

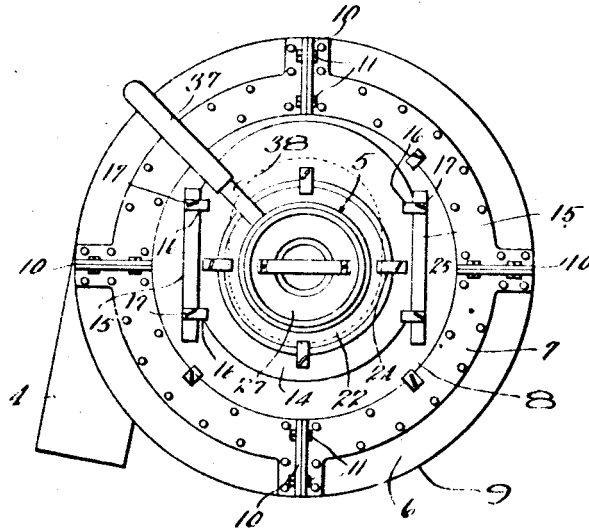


Fig. 2

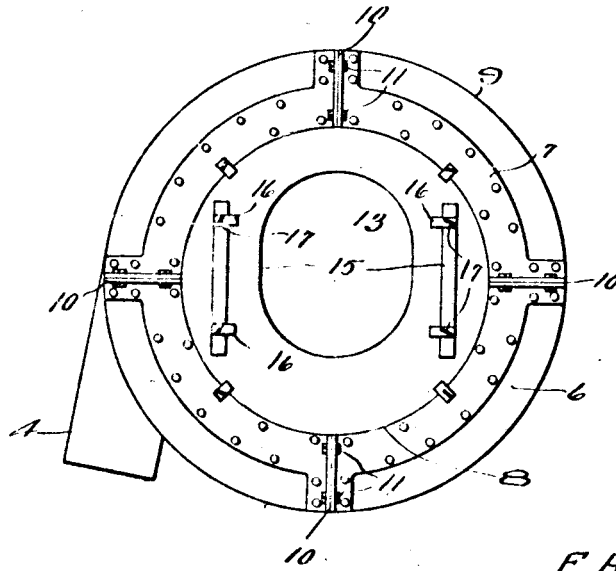


Fig. 3

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