J. J. POWER.

ROTARY DISCHARGING APPARATUS.

APPLICATION FILED FEB. 23, 1911.

1,033,929.

Patented July 30, 1912.

2 SHEETS—SHEET 1.

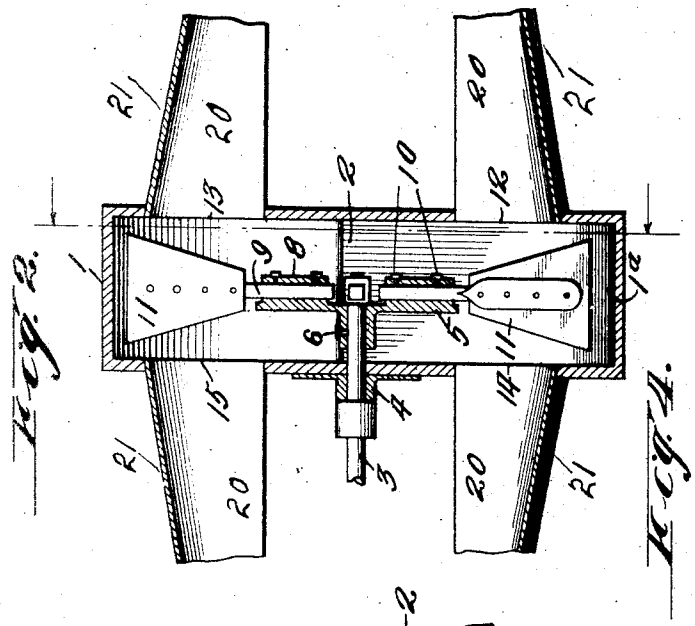

Fig. 2.

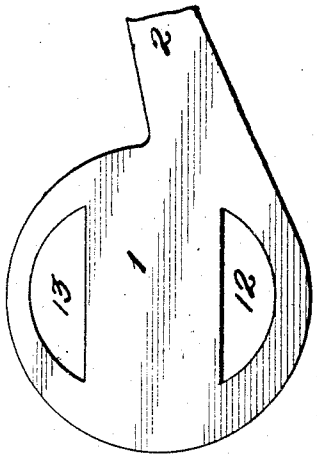

Fig. 4.

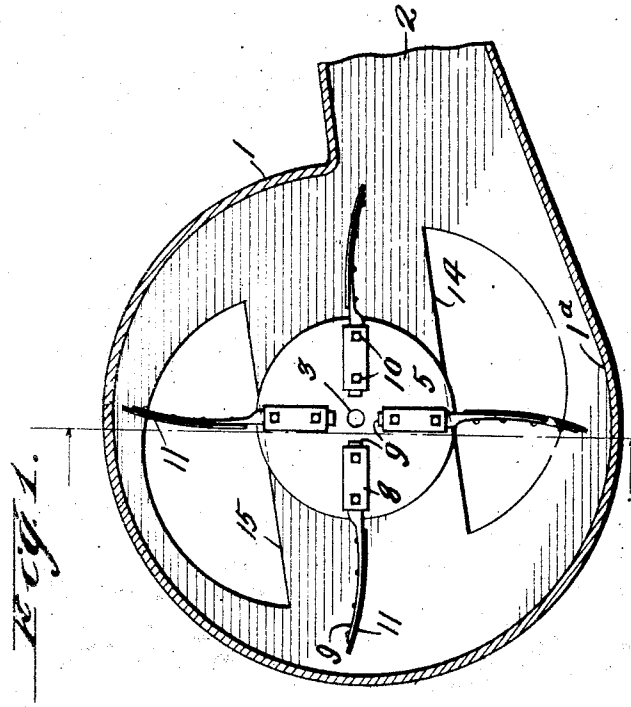

Fig. 1.

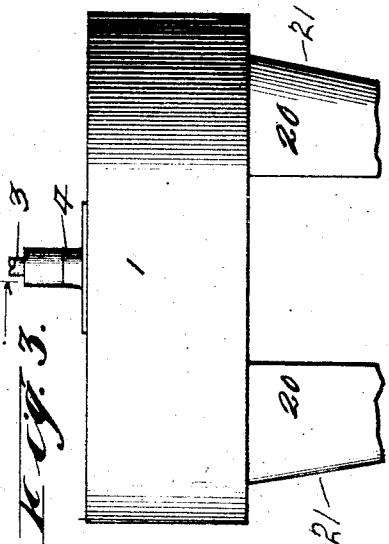

Fig. 3.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 6.

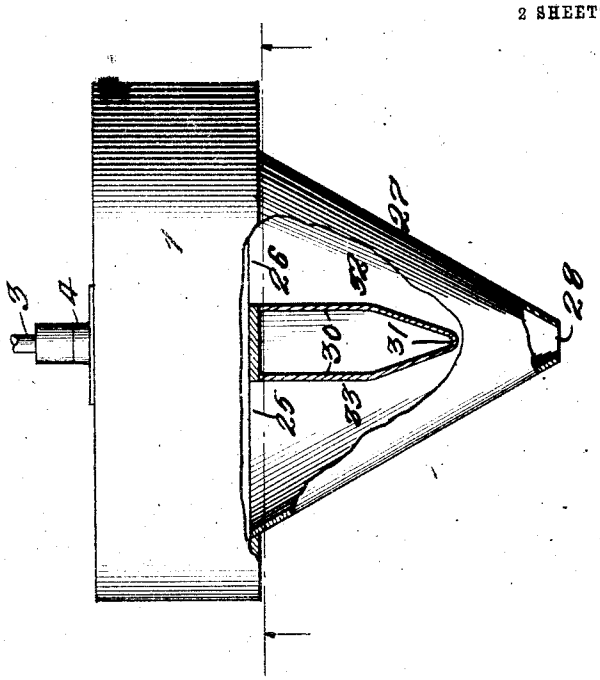
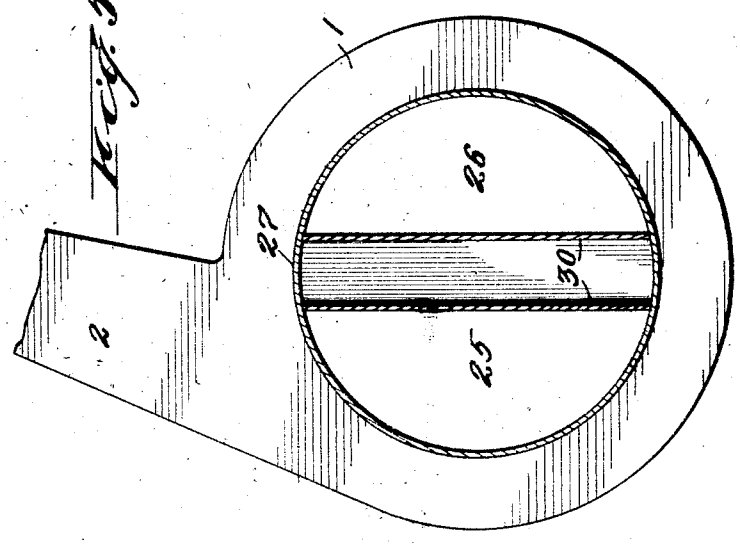


Fig. 7.



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UNITED STATES PATENT OFFICE.

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ROTARY DISCHARGING APPARATUS.

1,033,929. Specification of Letters Patent. **Patented July 30, 1912.**

Application filed February 23, 1911. Serial No. 610,269.

To all whom it may concern:

Be it known that I, JEFFREY J. POWER, a citizen of the United States, residing at the city of Madison, county of Dane, and State of Wisconsin, have invented new and useful Improvements in Rotary Discharging Apparatus, of which the following is a specification.

My invention relates to improvements in rotary discharging apparatus, with particular reference to that class of apparatus shown and described in my former patent, dated September 5th, 1905, and numbered 798,699, re-issued May 21st, 1907, and numbered 12,655. In such apparatus, the principle of operation differs materially from that of ordinary suction fans wherein air and other material are drawn in at the eye, and moved outwardly and circularly by fan wings to an outlet through which the air and other material, which has acquired sufficient velocity in rotation, is expelled by centrifugal force. In the device shown and described in my former patent, the material enters a casing within which are located a set of revolving wings, similar in form to those employed in suction fans, but such materials, (air and other material), instead of being carried around and discharged by centrifugal force, are delivered into the path of the wings in such a manner as to be struck and batted directly into and through the discharge chute.

The object of the present invention is to increase the efficiency of the machine described in my patent, above referred to, I having discovered that its efficiency is not limited to the capacity of a single inlet of maximum practical size.

In the following description, reference is had to the accompanying drawings, in which—

Figure 1 is a side view of a discharging chute, embodying my invention, with the casing shown in section on a plane cutting the axis of the discharge chute. Fig. 2 is a sectional view, drawn to a plane cutting the axis of the inlet openings and feed-ways. Fig. 3 is a plan view, showing my invention provided with two inlet feed-ways, the latter being partially broken away. Fig. 4 is a side elevation of the same, showing the inlet feed-ways in section. Fig. 5 is a view similar to Fig. 4, showing a modified form of feed-way construction. Fig. 6 is an elevation of the apparatus shown in Fig. 5, with portions of the casing walls partially broken away.

Like parts are identified by the same reference characters throughout the several views.

1 is a casing having a generally cylindrical form with a slight eccentric enlargement or extension of its peripheral wall on the side 1^a along which the discharging wings move in approaching the outlet or discharge chute 2, said chute extending tangentially from the periphery of the casing. A supporting shaft 3 extends through bearings 4 in one side wall of the casing, and is provided within the casing with a disk 5, which is rigidly secured to the shaft by a set-screw 6 or in any other convenient manner. One face of the disk 5 is provided with projections 8, having radial apertures or sockets in which wing shanks 9 are adapted to fit. The shanks 9 may be adjusted radially in the sockets and secured in any desired position of adjustment by screws 10. Discharging wings 11 are rigidly secured to the shanks 9. The walls of the casing are provided with a plurality of inlet apertures. Four of said apertures are illustrated in Fig. 2 at 12, 13, 14 and 15 respectively. These inlet apertures are located in the side walls of the casing between the axis of shaft 3 and circles in the respective side walls of the casing parallel with the outer circle of wing rotation. The apertures 12 and 14 are also substantially in line with the sides of the lower end of the discharge chute 2, whereby air and other material entering the casing through these apertures 12 or 14 may be struck by the wings 11 and thrown through the chute 2. The apertures 13 and 15 are located on the opposite side of the axis of the shaft 3 from that occupied by the apertures 12 and 14, and each of the apertures is preferably so formed that the marginal wall of the casing will be curved on the outer side and straight on the inner side, substantially as shown. The apertures are also of such dimensions that the central portion of the casing, at and surrounding the axis of the shaft will be closed. I prefer to have the entire central portion of the sides of the casing closed within a circle having a diameter nearly equal to that described by the inner margins of the wings 11, but exact dimensions are not essential. I also prefer

to locate the upper inlet apertures 13 and 15 with the larger portions to the front of the vertical plane of shaft 3, and the openings 12 and 14 with the larger portions to the rear of said plane, *i. e.* toward the side where the discharge chute 2 is located. The air or other material is delivered to the casing through feed-ways 20, which preferably extend outwardly in the form of a trough from the curved margins of the respective apertures, and the bottom of each trough inclines longitudinally in the direction of the line of the shaft axis as the distance increases from the casing. These feed-ways or troughs 20 preferably have a wall 21, which extends inwardly from one margin of the curved wall of the trough, but does not extend across the trough from one margin of the curved wall to the other. Air is thus permitted to enter the trough on the rear side, viz: that side which connects with the interior of the casing at a point toward which the wings travel in passing the opening through which the trough feeds.

The effect of the feed-ways or troughs above described is, (as set forth in my former patent), to set up a cyclonic whirl in the air delivered through the trough to the interior of the casing, the air being caused to rotate spirally in a direction opposite that of wing rotation, and progressively into the casing at an angle which causes the apex of the whirling current to enter the casing underneath the shield 21, whereby the air is projected at an angle against the advancing faces of the wings 11. I have discovered that the peculiar form of the trough, as above described, is not essential to the development of the whirling or cyclonic current of air in the feed-way, although it is a contributing factor of considerable importance. It is possible, however, to take the air in at the outer end of the feed-way and to secure a similar cyclonic whirl in the air current. I have also discovered that the capacity of the wings 11, for delivery of air through the chute 2, is not limited by the amount of air entering through a single feed-way of maximum practical size, but that by providing a similar feed-way on the opposite side of the shaft axis, the capacity of the device for air delivery may be very largely increased without any material additional expenditure of power. This appears to be due to the fact that, in the construction shown and described in my former patent, a vacuum was created in the upper portion of the casing, thus causing a suction which required a certain portion of the applied power to overcome. By providing auxiliary inlets on opposite sides of the shaft axis, the vacuum in the upper part of the casing is relieved and the air entering through the upper opening or openings is carried around and thrown out through the discharge chute by centrifugal force, and this does not appear to interfere to any appreciable extent with the capacity of the wings 11, to bat air through the discharge chute which enters through the lower feed-opening or openings, but owing to the centrifugal pressure of the air which enters through the upper inlets, it is desirable to enlarge the peripheral wall of the casing, as shown at 1^a, in order to reduce the frictional pressure. I have found also that the longitudinal inclination of the outer or curved wall of the feed-way, whereby it is made to diverge from the line of the shaft axis as it approaches the inlet, is a factor in securing the best results in the development of the cyclonic whirl in the air current, and I am, therefore, enabled to utilize this characteristic of my formerly patented invention in providing a discharging apparatus which is specially adapted for use as a vacuum cleaning apparatus capable of producing an intense suction at an end inlet common to a plurality of feed-ways. This modification of my invention is illustrated in Figs. 5 and 6, wherein the fan casing 1 is provided with a plurality of inlet apertures 25 and 26 of substantially the same form as the apertures illustrated in Figs. 1 and 2, although slightly larger. In this construction both apertures are encircled by a feed-way wall 27 which extends outwardly from the fan casing and tapers to an elongated slot or elliptical opening at 28. Where the wall 27 connects with the casing it is substantially cylindrical in form, as shown in Fig. 5. The sides are flattened in the direction of the straight margins of the apertures 25 and 26, and from these margins of the apertures a partition 30 extends outwardly and tapers to a wedge-shaped extremity at 31 in line with the elongated opening at 28. With this construction it will be observed that air entering through the opening 28 is divided by the partition 30 and delivered into two feed-way cavities or passages 32 and 33, leading to the inlets 25 and 26 respectively. The air delivered through the casing inlet 25 will be batted out through the discharge chute 2, while that entering through the inlet 26 will be carried around by centrifugal force and thrown out through the discharge chute. The air delivered by centrifugal force and which enters through the opening 26, (the openings 13 and 15 in Fig. 2) will be, to a large extent, beyond the range of the air current entering through the opening or openings nearest to the discharge chute, since it will have moved outwardly by centrifugal force during the revolution of the wing from one opening to the next. There is, therefore, little interference between the two volumes of air, and apparently that air which is batted out through the chute is delivered in

advance of the air thrown out by centrifugal force, so that the capacity of the discharge chute does not require to be greatly enlarged over that required for apparatus having but a single inlet aperture.

Where my invention is used merely for the delivery of air, it may be provided with more than two inlets and more than two feed-ways, four feed-ways and inlets being illustrated in Fig. 2. As illustrated in Figs. 5 and 6, I may arrange two feed-ways with a common inlet at the end so that the apparatus may be adjusted with the wings revolving in a horizontal plane, and the feed-way inlet 28 adjusted in proximity to a surface to be cleaned. In any event, the apparatus as herein described delivers air or other material partly by centrifugal action and partly by a batting action, as above set forth. While I have described the air entering the apertures most distant from the outlet or discharge chute, as being delivered by centrifugal force, I find that to secure the best results, feed-ways of trough shape should be used for all the inlets, in order to cause the air to whirl and become concentrated before entering the fan casing, but such troughs may be open to the exterior only at the end if desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. In a device of the described class, the combination of an inclosing casing provided with a peripheral discharge aperture, a set of revolving wings in said casing, a feed way leading to an aperture in the casing between its periphery and the axis of wing rotation in a position to deliver material into the path of the wings as they approach said discharge aperture, and another feed way leading to an aperture in the casing between its periphery and the axis of wing rotation at a greater distance from the discharge aperture than the point of delivery through the first mentioned feed way, whereby the material entering through the first mentioned feed way may be batted through the discharge aperture and the material entering through the other feed way, may be carried around and delivered through the discharge aperture by centrifugal force.

2. In a device of the described class, the combination of an inclosing casing provided with a peripheral tangential discharge aperture, a set of revolving wings in said casing adapted to deliver air and other material through said aperture by centrifugal force, and a plurality of inlet apertures in the side wall of said casing, one of said apertures communicating with a laterally extending feed way and being located substantially opposite the axis of the discharge chute projected into the casing and the other of said apertures being more distant therefrom.

3. In a device of the described class, the combination of a set of revolving wings, an inclosing casing therefor provided with a plurality of inlets and having a discharge aperture in a position to permit a tangential delivery of material carried by the wings, and a feed way leading to an aperture in the casing between its periphery and the axis of wing rotation, and having walls permitting the development of a cyclonic whirl in the air entering through said feed way, said feed way being also arranged to deliver material through one of said inlets into the path of the wings as they approach said discharge aperture, and another of said inlets being adapted to admit air into the path of the wings at a point sufficiently distant from the discharge aperture to permit the development of centrifugal force in such air before reaching the discharge aperture.

4. In a device of the described class, the combination of an inclosing casing provided with a discharge aperture, and having a plurality of inlet apertures between its periphery and the axis of wing rotation, a partition wall extending outwardly from the casing between the inlet apertures, and feed way walls encircling the partition wall and forming, with the latter, a plurality of passage ways leading to the inlet apertures of the casing.

5. In a device of the described class, the combination of an inclosing casing provided with a discharge aperture, and having a plurality of inlet apertures between its periphery and the axis of wing rotation, a partition wall extending outwardly from the casing between the inlet apertures, and feed way walls encircling the partition wall and forming, with the latter, a plurality of passage ways leading to the inlet apertures of the casing, said feed way being closed except at its outer end beyond the partition.

6. In a device of the described class, the combination of an inclosing casing provided with a discharge aperture, and having a plurality of inlet apertures between its periphery and the axis of wing rotation, a partition wall extending outwardly from the casing between the inlet apertures, and feed way walls encircling the partition wall and forming, with the latter, a plurality of passage ways leading to the inlet apertures of the casing, said feed way walls converging outwardly to an elongated end opening substantially in the plane of and beyond said partition.

7. In a device of the described class, the combination of an inclosing casing provided with a discharge aperture, and having a plurality of inlet apertures between its periphery and the axis of wing rotation, a partition wall extending outwardly from the casing between the inlet apertures and feed way walls encircling the partition wall and

forming, with the latter, a plurality of passage ways leading to the inlet apertures of the casing, said feed way walls converging outwardly to an elongated end opening, substantially in the plane of and beyond said partition,—one of said feed ways being adapted for the delivery of air into the path of the fan wings at a point substantially in line with the path of the material through the discharge aperture.

In testimony whereof I affix my signature in the presence of two witnesses.

JEFFREY J. POWER.

Witnesses:
IRMA D. BREMER,
LEVERETT C. WHEELER.