J. W. NEWCOMBE.

CENTRIFUGAL DUST SEPARATOR.

APPLICATION FILED MAY 10, 1920.

1,420,665. Patented June 27, 1922.

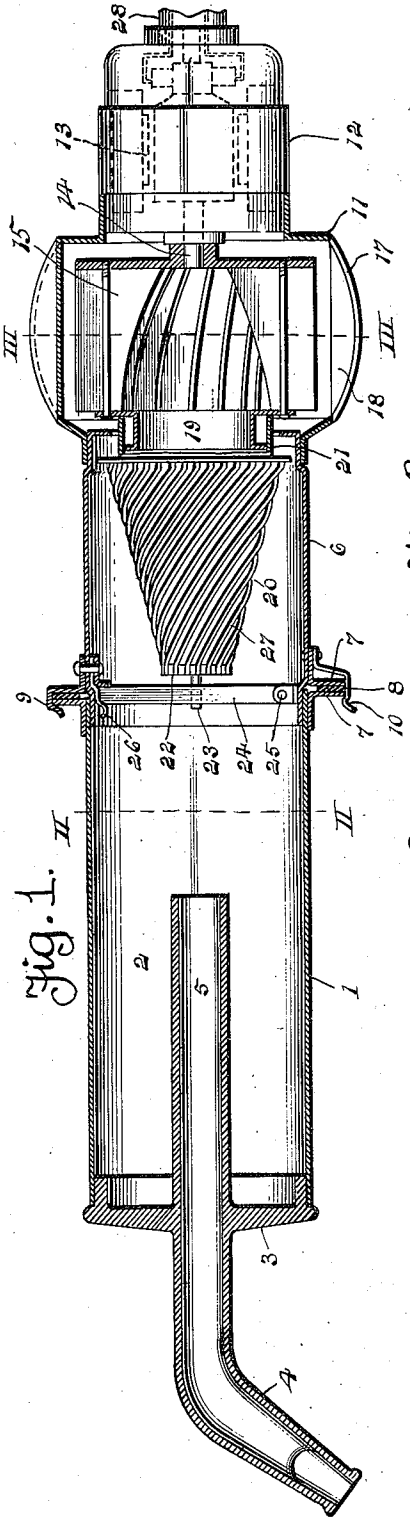


Fig. 1.

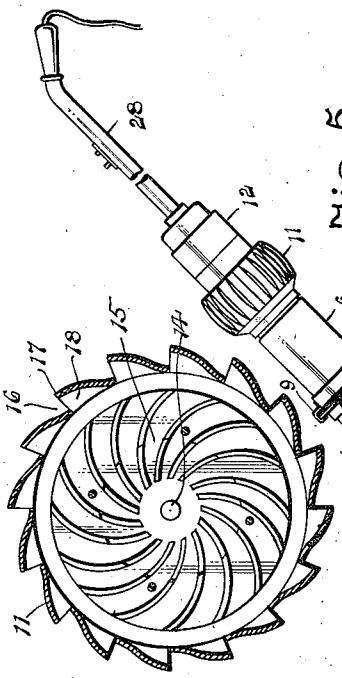


Fig. 3.

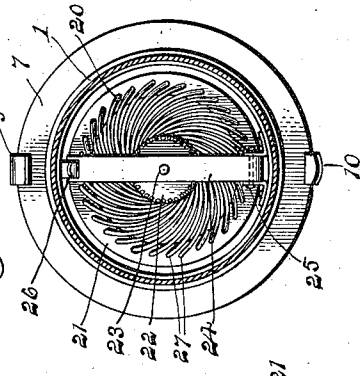


Fig. 2.

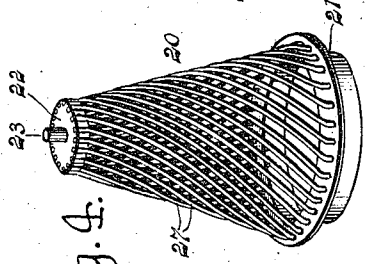


Fig. 4.

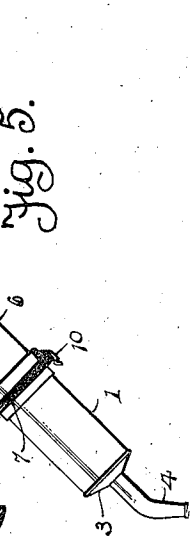


Fig. 5.

Inventor

John W. Newcombe,

By Cushman, Darby & Cushman

Attorneys

UNITED STATES PATENT OFFICE.

JOHN W. NEWCOMBE, OF DETROIT, MICHIGAN.

CENTRIFUGAL DUST SEPARATOR.

1,420,665. Specification of Letters Patent. Patented June 27, 1922.

Application filed May 10, 1920. Serial No. 380,065.

To all whom it may concern:

Be it known that I, JOHN W. NEWCOMBE, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Centrifugal Dust Separators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to devices for separating solid or other particles from air or other fluids, and more particularly to devices in which a separation is effected by purely mechanical action.

An object of the invention is to provide a simple mechanical device which will effectually separate dust and other foreign matter from air, gases or other fluids passed therethrough and the construction of which is such as to adapt the same for installation in machines and apparatus of various types and for various uses.

A further object is to provide a device of this character which is particularly applicable to vacuum sweeper constructions, and further, to provide a construction having certain other new and useful features.

The invention consists in providing a perforate member within the path of the fluid flow and from which flow particles of matter are to be separated, said perforate member being rotated by power at a rate of travel which is such in proportion to the rate of travel of the particles carried by the fluid, that these particles will be intercepted by and will impinge upon the portions of the member between its perforations, being thereby deflected and precipitated out of the flow passing through the perforations.

The invention further consists in providing a simple mechanical construction whereby the device may be readily applied to various uses and to different machines and apparatus, and wherein it is particularly applicable to vacuum sweeper constructions.

The invention further consists in certain other matters hereinafter set forth and all as hereinafter more fully set forth and particularly pointed out in the appended claims, reference being had to the accompanying drawing in which—

Figure 1 is a longitudinal section through a vacuum sweeper embodying the invention and illustrative of an application of the invention in use;

Fig. 2 is a transverse section substantially upon the line II—II of Fig. 1;

Fig. 3 is a similar section substantially upon the line III—III of Fig. 1;

Fig. 4 is a perspective detail of a separator member detached; and

Fig. 5 is a side elevation of the vacuum sweeper shown in Fig. 1 and drawn to a reduced scale.

It will be understood that while the device for separating dust particles from air is shown in the accompanying drawing, as applied to a vacuum sweeper, that the invention may be applied for use in separating dust and other foreign matter from air, gases or other fluids in other devices or machines, or may be used separately and alone as a separator unit.

The form and construction of separator device embodying the invention makes this device particularly adaptable for use in connection with vacuum sweepers, as illustrated, this separator device being substituted or used in place of the usual dust bag into which the dust laden air is forced by the motor driven fan. In a vacuum sweeper construction embodying this invention, the dust laden air is drawn in by means of the usual suction fan but the dust is separated from the air prior to the air reaching the fan and prior to its escape into the open air.

As shown in the drawing, 1 represents a suitable tubular casing forming a dust receiving chamber 2 and this casing is closed at its lower end by a adetachable head 3 having the usual suction nozzle 4 adapted to be engaged with and moved over the surface to be cleaned. This suction nozzle has an inner end portion 5 which is extended into the dust chamber 2 for a considerable distance so that a suitable pocket or chamber is formed in the lower end of the casing 1 around this inwardly extending end 5 of the nozzle to receive the dust and particles which are separated from the air. A tubular separator casing 6 forms an extension of the casing 1 and is detachably secured thereto in axial alignment therewith in any suitable manner to make a tight joint, as by providing outstanding flanges 7 on the confronting ends of the two casings with a suitable packing ring 8 interposed and the two flanges held in clamping engagement with the packing by means of a hook 9 at one side and a spring clip 10 at the other

side to engage these flanges and hold the casing parts firmly united. At the upper end of the separator casing 6 and in axial alignment therewith is a fan casing or chamber 11 and formed integral with the upper end of the fan casing, is a motor casing 12 in axial alignment with the other casings. Within the motor casing 12 is a suitable electric motor indicated at 13 and having a shaft 14 at its axis to which the suction fan 15 is secured. This suction fan may be of any suitable construction, it being preferably of axial inlet type, with a peripheral discharge so that the air will be drawn into the fan longitudinally thereof at its axis and discharge radially by the several blades. The periphery or circular wall of the casing 11 is formed with a series of outlet openings 16 for the escape of air discharged by the fan, said opening 16 being preferably formed by slitting the casing longitudinally and bending outwardly the metal at one edge of each slit, as indictated at 17, thus providing a series of elongated openings 16 having curved or formed throat portions 18 extending tangentially of the casing peripherally in the direction of rotation of the fan 15.

The fan wheel 15 is provided with a tubular extension 19 which extends a short distance into the casing 6 and mounted at one end upon this tubular extension, is the rotatable dust separator indicated as a whole at 20. This separator member 20 has a flanged ring member or head 21 at one end to fit closely over the tubular extension 19 on the fan wheel so that it will be supported by the fan wheel at one end and will rotate therewith. A head 22 at the opposite end of the separator member is provided with a trunnion 23 to engage a cross bar 24 having a bearing to receive the trunnion and extending transversely of the casing 6 in the lower end thereof. This cross bar 24 is pivotally secured at 25 to one side of the casing at one end and is detachably held at its opposite end at the other side of the casing by means of a suitable spring clip 26. By releasing the clip 26, the cross bar may be turned upon its pivot to disengage it from the trunnion 23 so that the separator member 20 may be slipped endwise out of engagement with the fan wheel and removed from the casing for the purpose of cleaning or repair.

The ring member 21 and head 22 of the separator are connected by a series of small wires 27 securely held at their ends in any suitable manner in openings in said heads and these wires extend spirally from one head to the other and as the head 22 is of much less diameter than the head 21, these several wires together form a truncated conical wall, the several wires being spaced short distances apart so that the air drawn in through the nozzle 4 by the fan wheel 15 may pass freely through the interstices between the wires forming this conical wall. The spiral lead of these several wires from the small or lower end of the cone toward the large end is preferably in a direction opposite to the direction of rotation of the cone.

It has been found that a conical shaped separator member formed of a large number of small wires extending longitudinally and spirally of the cone and spaced short distances apart, is most efficient in its operation of separating dust and other particles from air, but it will be understood that this invention contemplates the use of other forms of rotatable separators through the perforations of which the fluid passes and which are rotated at such a speed as to intercept all particles carried by the stream and by the centrifugal or deflecting action set up by the rapid rotation of the member, throw off or deflect the particles laterally and thus separate them from the air stream.

A conical separator member formed of a plurality of longitudinally and spirally extending wires, provides an extended perforate surface through which the air passes freely and at the same time presents an extended surface into contact with which the dust particles come as the air passes through the member. The rapid rotation of the conical member insures the contact of the wires with every particle of dust carried by the air before such particle can pass between the wires and when such particle comes in contact with a wire, it is deflected or is set into rapid rotation and is either thrown off laterally at once by centrifugal force or deflection or passes longitudinally along the wire toward the enlarged upper end or head 21 where it will be caught by the head and then thrown off laterally by centrifugal force. The spiral direction of the wires assists in the travel of the dust particles along these wires toward the large end of the cone where the centrifugal force is greatest.

In order that the device may be conveniently handled as a sweeper, a handle extension 28 is secured to the end of the motor casing 12 and the usual wires leading to the motor are carried within this handle in the usual manner.

Obviously the arrangement may be such that the air or other fluid may be forced or blown through the separator member instead of being sucked through as in the construction shown, and the particular form or arrangement of casing and the manner in which the separator member is driven may be varied within the scope of the appended claims, to suit the particular installation of the separator device. Further, the form, construction and arrangement of the per-

forate rotatable separator may be varied within the scope of the appended claims without departing from the spirit of this invention and I do not therefore limit myself to the construction, arrangement or combination of parts as shown.

Having thus fully described my invention, what I claim is:—

1. In a device of the character described, the combination with a casing having an inlet and an outlet, of a conical rotary separator member in said casing having an open end closing the passage to the outlet and arranged with its end of smaller diameter toward the inlet, the conical wall of said member being formed with a plurality of openings with the portions between said openings continuous throughout the length of said wall, means for forcing a flow through the casing and separator member, and power means for rotating the separator member at a rate of travel proportionate to and greater than the rate of travel of the particles carried by the flow, whereby the portions of said separator member between said openings are caused to intercept said particles and convey them longitudinally of and toward the large end of the separator member.

2. A device of the character described comprising a casing, power driven means for causing a flow of air through the casing, a rotatable separator member in the casing formed with spiral openings for the passage of air therethrough, and power means for rotating the separator member.

3. A device of the character described comprising a casing, means for inducing a flow through the casing, a rotatable separating member mounted in the casing and provided with openings extending spirally thereof in the direction of its length, and power means for rotating the separator member.

4. In a device of the character described the combination of a casing, a power driven rotatable separator member mounted in said casing and including a series of spaced wires extending spirally of said member in the direction of the flow through the casing, said wires forming a perforate wall for said member, and power driven means for causing a flow through the casing and through the perforate wall of said member.

5. A device of the character described comprising a casing, means for causing a flow of air through the casing, a separator member within the casing having a conical wall formed of a plurality of spaced members extending longitudinally of the wall and spirally thereof, and means for rotating said member.

6. A device of the character described comprising a casing, means causing a flow of fluid through the casing, a separator member in the casing comprising a plurality of spaced wires arranged spirally in the direction of the length of the separator member, and power means for rotating the separator member.

7. A device as defined in claim 6, in which the separator member is conical and has the smaller end set toward the inlet for the air.

8. A device of the character described comprising a casing, means causing a flow of air through the casing, a conical separator member consisting of a series of wires extending spirally between two heads mounted for rotation on an axis coincident with the longitudinal axis of the casing, and means for rotating the separator member.

9. A separator member consisting of a series of spaced wires extending spirally in the direction of the length of said member and connecting two heads, means for rotating the separator member on its longitudinal axis, and means for causing a flow of air through the separator member.

10. The combination of a tubular casing, a motor at one end of the casing having a shaft mounted for rotation on an axis coincident with the longitudinal axis of the casing, a rotary device mounted on the shaft for rotation thereby to produce a flow of air through the casing, said rotary device having a tubular extension, and a separator member extending longitudinally of the casing and having a perforate side wall and an end adapted to engage the tubular extension to be rotated thereby and opening into said extension to form a passage for the air passing through said perforate wall of the member.

11. A device as defined in claim 10 and wherein the tubular casing is closed at the end remote from the motor, and an inlet tube extends through said closed end with the inner end of the tube extending into the casing at the axis thereof and with its open inner end in alignment with and at a distance from the closed lower end of the separator member.

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

JOHN W. NEWCOMBE.

Witnesses:
ANNA M. DORR,
LEWIS E. FLANDERS.