March 27, 1928. 1,664,092

J. SQUIRES

DIRT AND AIR SEPARATION

Filed Nov. 1, 1924

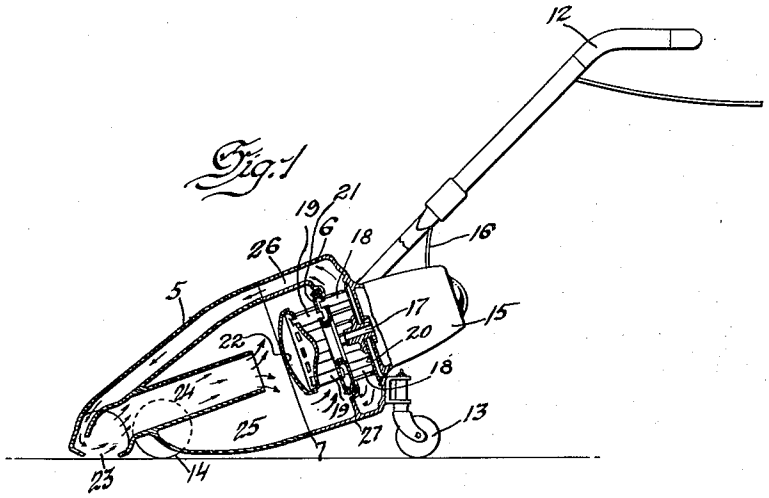

Fig. 1

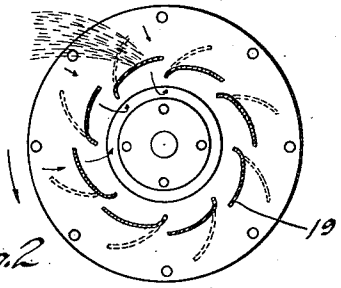

Fig. 2

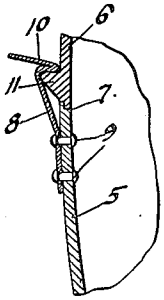

Fig. 4

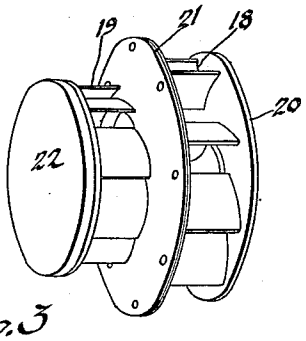

Fig. 3

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UNITED STATES PATENT OFFICE.

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DIRT AND AIR SEPARATION.

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It is the primary object of my invention to effect the separation of dust, dirt and other foreign matter from air by impacting such matter from the air course.

My invention relates broadly to such separation, but I have shown it specifically as applied to a vacuum cleaner, and shall hereafter describe its operation and utility in such connection, it being specifically pointed out, however, that I do not wish to be limited to a use of the invention upon vacuum cleaners.

It is the general practice in the vacuum cleaner art to employ a chemically treated bag, in which the mixture of air and dirt is deposited, the air escaping through the pores of the bag while the dirt is held therein.

It is one of the primary objects of my invention to do away with the necessity for such a bag. I am aware that other attempts to abolish the customary bag used on vacuum cleaners have been made, such as the centrifugal force separation device disclosed in patent to J. W. Newcomb, No. 1,420,665, patented June 27, 1922, and the impacting of the mixture of dirt and air against a stationary member, such as is shown in the patent to J. J Duffie, No. 1,234,095 patented July 17, 1917, and analogous patents. Both of these methods, however, are not satisfactory for the reason that they do not thoroughly separate dirt and foreign matter from the air.

I accomplish a complete separation by directing the air and dirt against a swiftly rotating series of blades, the open ends of which are so related to each other as to prevent a direct passage between them when rotation at a pre-determined velocity is had. This relation of the blades and the rapid rotation of the same will cause all matter heavier than air to be thrown away from the blades when they strike against the same, while the air may be drawn in a curved manner under the edges of the blades.

Other objects and details of construction will be apparent as the specification follows.

With the above and other objects in view, therefore, my invention consists in the arrangement, combination and construction of the various parts of my improved device and the methods utilized in connection therewith as described in the specification, claimed in my claims and shown in the accompanying drawings, in which:

Fig. 1 is a view partly in section and partly in elevation showing my improved device as applied to a vacuum cleaner.

Fig. 2 is a perspective view showing the suction blades and impact blades utilized in my invention.

Fig. 3 is a view showing more or less diagrammatically the action of the impact blades utilized in my invention.

Fig. 4 is a detail view showing the method of attachment of the lower end of the vacuum cleaner disclosed in Fig. 1 with the upper end thereof.

I have shown a vacuum cleaner consisting generally of a lower section 5 and an upper section 6 having their adjacent edges dovetailed as at 7, so as to effect a tight joint between them, the lower portion 5 having a spring member 8 secured thereon as by rivets 9, the upper bent portion 10 thereof forming a clip engaging over the projection 11 provided on the upper portion 6.

The customary handle 12 for operating the cleaner is provided as are also rear wheels 13 and front wheels 14 for wheeling the cleaner from place to place.

Secured on the upper member 6 is a conventional electric motor 15, which may be connected with a suitable source of electrical energy by the wire 16. The motor 15 has its shaft 17 extending into the portion 6 of the cleaner and positioned on the shaft are the operating elements consisting of suction producing blades 18 and impact blades 19. The plate 20 on the bottom of the operating mechanism acts as a seal between the motor 15 and the suction blades and the plates 21 act as separation elements between the suction blades 18 and the impact blades 19. The cap 22 provided on the free ends of the impact blades 19 acts to cause the deflection of air and dirt around the same to provide axial flow against the faces of the impact blades 19.

The bottom portion 5 of the cleaner is provided with an opening 23, leading through the passage 24, which passage extends adjacent the face of the cap 22.

When the motor 15 is rotated, corresponding rotation of the blades 18 and 19 will occur with the result that the blades 18 create a suction sufficient to draw air and dirt from

the floor through the opening 23 and the passage 24. The course of this air and dirt is such that it will strike against the face of the cap 22 and will be deflected around the edges of the cap 22 as indicated by the arrows, so as to impact axially against the overlapping blades 19 with the result that all matter heavier than air will be impacted away, as shown diagrammatically in Fig. 3 and will fall into the chamber 25. The air will find its way between the blades 19 and will pass out through the suction blades 18 and thence through the passage 26 back again to the mouth of the cleaner where it may be reutilized. This action is also indicated by the arrows in Fig. 1. The circular flange 27 adjacent the plates 21 prevents the passage of this air into the chamber 25.

By neither depending upon the action of centrifugal force nor the impacting of the dirt or air against a stationary member for separation, a much more efficient and thorough separation of the dirt and air is had.

At intervals the lower portion 5 of the cleaner may be removed by releasing the clips 10, the accumulated dirt and foreign matter emptied out and the portion 5 again replaced for continued use.

It will be noted that the blades are so arranged as to present a uniform structure throughout the width thereof, so as to bring about a uniform separating action at all points. The blades are further upwardly curved so as to prevent deflection of foreign matter between them.

The speed of rotation necessary for the separating blades depends upon the space allowed between the free and secured ends of the blades. That is to say, if the space is large, a faster rotation must be effected in order to prevent dirt passing between them, but if the space be small, the speed of rotation may be lessened.

It is obvious that various changes may be made in the arrangement, combination and construction of the various parts of my improved device without departing from the spirit of my invention and it is my intention to cover by my claims such changes as may be reasonably included within the scope thereof.

What I claim is:

1. A cleaner of the class described comprising a housing, an opening in said housing, a motor, a suction producing device and a rotatable separating device in said housing and operated by said motor to draw air and foreign matter through said opening and separate the two, a chamber in said housing for holding the separated foreign matter and a passage through which said separated air may pass, said passage having an opening extending adjacent said first opening, whereby said air may re-enter said opening and be re-used.

2. In combination, a housing having a suction opening and a rotatable fan for creating suction in said opening, a circular plate on the bottom of said fan, a plurality of blades under said plate, a second plate under said blades and disposed in the path of said suction, whereby said second plate will deflect the incoming air to strike said blades on their faces.

3. A cleaner of the class described comprising a device having an opening therein, suction and discharge producing means for producing an angular flow of air to and away from said opening by which foreign matter present at said opening is taken into said air flow, means for separating said air and foreign matter, said separating means consisting of a rotating member having blades adapted to so agitate the mixture of air and foreign matter passing into it that all the foreign matter will come in contact with the forward faces of the blades of the rotating member and will be impacted out of the mixture, while permitting the air to pass through, a chamber in said device for holding the separated foreign matter and a passage through which said separated air may pass, said passage having an opening extending into said first opening whereby said air may be re-used.

JOHN SQUIRES.