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S. FOLDES

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VACUUM CLEANER

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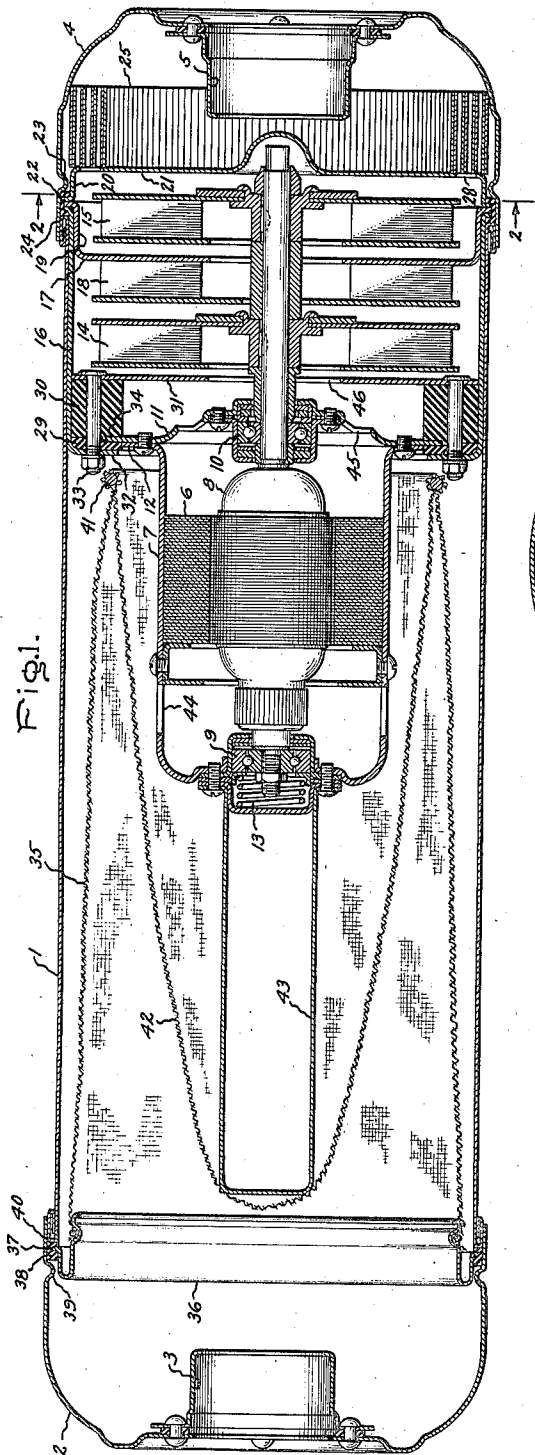


Fig. 1.

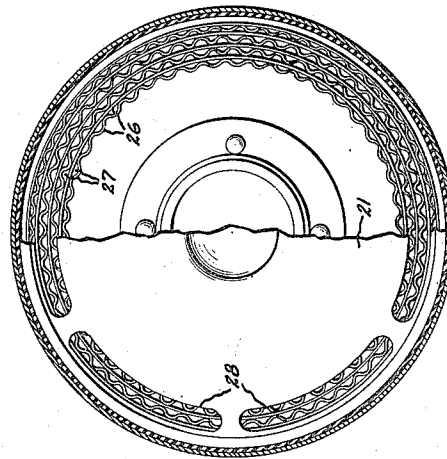


Fig. 2.

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UNITED STATES PATENT OFFICE

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VACUUM CLEANER

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1 Claim. (Cl. 230—233)

The present invention relates to vacuum cleaners of the type in which the suction fan and dirt separator are located within an enclosing casing.

The object of my invention is to provide an improved construction and arrangement in cleaners of this type which reduces the noise of operation, and for a consideration of what I believe novel and my invention, attention is directed to the following description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a sectional elevation of a vacuum cleaner embodying my invention, and Fig. 2 is a sectional view partly broken away taken on line 2—2 of Fig. 1. Referring to the drawing, there is shown a vacuum cleaner having a cylindrical casing 1 having a cap 2 at one end provided with a cylindrical reentrant inlet opening 3 and having a cap 4 at the other end provided with a cylindrical reentrant discharge opening 5. Within the casing 1 is an electric motor consisting of a stationary member 6 fixed in a cup-shaped shell 7 and a rotating member 8 journaled at one end in a ball bearing 9 fixed to the shell 7 and journaled at the other end in a ball bearing 10 fixed to a disk 11 secured to an outwardly projecting flange 12 on the motor shell. The end thrust of the motor is resiliently cushioned by a spring 13 arranged between the ball bearing 9 and its housing. Locked on the motor shaft are fans 14 and 15 which discharge to a fan housing within the discharge end of the casing 1. The fan housing comprises a cylindrical member 16 telescoped within the discharge end of the casing 1 and a cup-shaped member 17 telescoped within the cylindrical member 16. The fan 14 discharges peripherally to the fan housing member 16 and the air discharged therefrom flows to the inlet of the fan 15 through straightening vanes 18 fixed to the housing member 17. The straightening vanes 18 remove the rotational or swirling motion of the air discharged from the fan 14. The fan 15 discharges peripherally to an annular passage surrounding the fan provided by the axially extending walls 19 of the fan housing member 17 and by axially extending walls 20 of a disk 21 which forms the outer end wall of the fan housing. The parts 16, 17, and 21 of the fan housing are provided with outwardly extending flanges 22 which are clamped between a bead 23 on the cap 4 and a shoulder 24 at the end of the casing 1. The air discharged from the fan 15 has a rotational or swirling motion which unless removed would increase the noise of

operation. This swirling motion of the air is removed by an annular sound absorber or reducer 25 arranged within the cap 4 around the reentrant discharge opening 5. The sound absorber comprises a plurality of layers of corrugated paper 26 providing axially extending tubular passages 27 between the corrugations. The air flows axially through openings 28 in the disk 21 through the tubular passages 27 of the sound absorber to the discharge outlet 5. Since the tubular passages are presented transverse to the swirling motion of the air, the air flowing through the tubular passages loses its rotational or swirling motion and, when discharged from the tubular passages, has a substantially straight line motion. The sound absorber 25 produces a material reduction in the noise of operation. The noise of reduction is believed to be due to the fact that the spiral or swirling motion of the air is removed, and also to the fact that the air flows through elongated passages of non-metallic sound absorbent material. Other materials than corrugated paper may be used for the sound absorber.

The motor is resiliently supported by rubber rings 29 and 30 clamped between a disk 31 and an inwardly extending flange 32 on the fan housing member 16 by bolts 33 extending through the rubber rings. The outer edge of the disk 11 fits in a recess 34 in the rubber ring 30 and is clamped between the rubber rings 29 and 30 to resiliently support the motor. The outer edge of the motor shell flange 12 rests against the inner edge of the rubber ring 29. There is accordingly no metal-to-metal contact between the motor and the fan housing which would result in the transmission of noise.

The air drawn through the inlet opening 3 is filtered through a cylindrical bag 35 clamped at its open end to a metal ring 36 having an outwardly extending flange 37 carrying a sealing ring 38 which is clamped between a bead 39 on the cap 2 and a shoulder 40 at the inlet end of the casing. The bag extends inwardly around the motor and at its inner end is provided with a spacing ring 41 which keeps the bag out of contact with the motor. The bag has a reentrant portion 42 extending from the ring 41 toward the inlet opening 3 and held in a central position by a projection 43 fixed to the motor shell 7. The air passing through the bag flows through openings 44 in the motor shell 7 through the motor and through openings 45 in the disk 11 and through an opening 46 in the disk 31 to the inlet of the fan 14.

In the use of the cleaner a flexible hose provided with a suitable suction nozzle is connected to the inlet opening 3. The dirt laden air drawn through the suction nozzle is filtered through the bag 35, and the clean air is discharged through the discharge opening 5. When the cleaner is used as a blower, the flexible hose is removed from the inlet opening 3 and connected to the discharge opening 5.

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

In combination, a centrifugal fan impeller, a casing therefor providing an annular passage

around the impeller to which air is discharged from the impeller with a swirling motion about the axis of the impeller, an end wall for the casing having axial discharge openings from said annular passage, a cap enclosing said end wall and having an outlet therein, and an annulus of corrugated material between said cap and said end wall having elongated tubular passages presented to said discharge openings transversely to the swirling air for conducting air to the outlet.

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