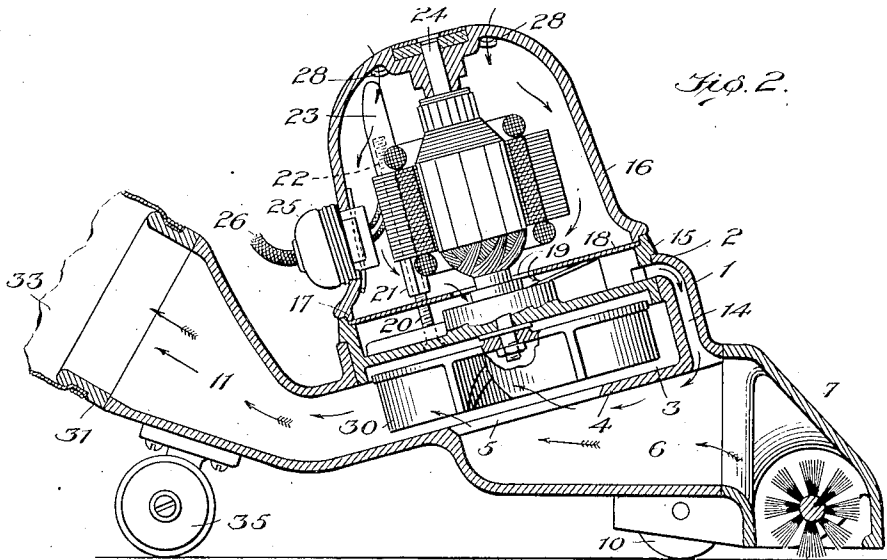
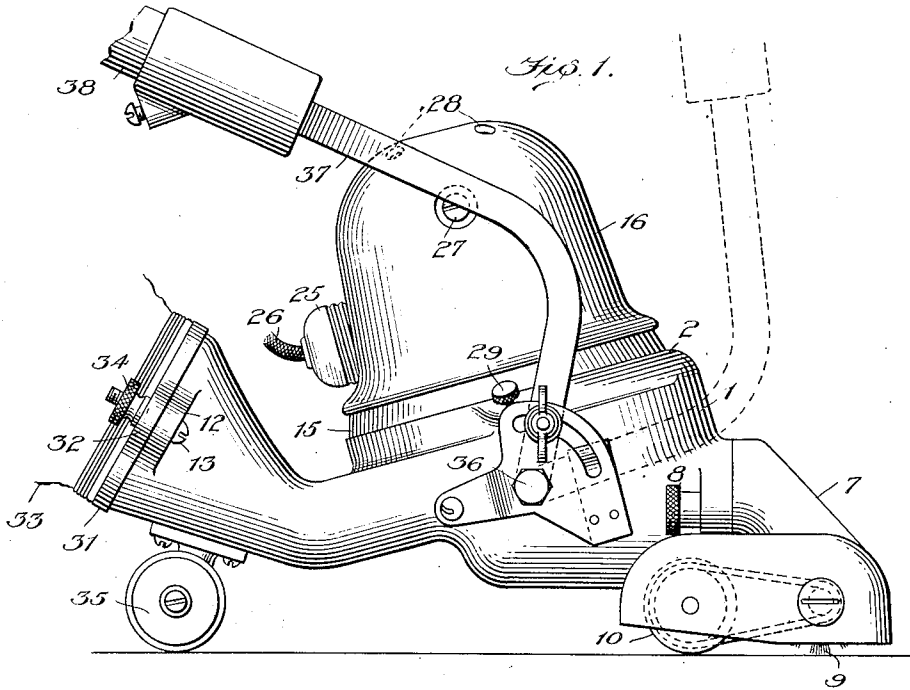


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 MEANS FOR AIR COOLING MOTORS.
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UNITED STATES PATENT OFFICE.

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MEANS FOR AIR-COOLING MOTORS.

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To all whom it may concern:

Be it known that I, HARMON H. HARROLD, a citizen of the United States, residing at New Philadelphia, in the county of Tuscarawas and State of Ohio, have invented certain new and useful Improvements in Means for Air-Cooling Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to vacuum cleaners in general, but more particularly to cleaners of the portable power-actuated type, wherein the motor and fan or suction elements are located adjacent to, and are movable with the intake or nozzle element over surfaces to be cleaned, the present application for Letters-Patent being a division of application Serial No. 53,036, filed September 28th, 1915.

The primary object of my present invention is the production of relatively inexpensive, noiseless, and peculiarly efficient means for automatically air-cooling the rapidly revolving armatures and all movable parts of the high speed motors used in power-actuated vacuum cleaners, both portable and stationary.

It is necessary, as a matter of course, that the motors used in this class of devices be suitably shielded or housed, this being usually accomplished by means of an inclosing motor case or dome within which the motor may be driven at a high rate of speed, without danger other than to the motor itself. This speed and constant usage, however, ordinarily causes overheating, and, as a consequence frequently loosens the wires and various connections in electric motors causing all manner of electrical troubles, which however, are obviated by the employment of my improved air-cooling means.

It is also understood by persons skilled in the art to which my invention relates that another frequent source of electrical trouble with motors located thus within closed casings or domes results from constant wear of the carbon brushes upon their respective commutators, causing the fine dust-like particles of copper and carbon, thus worn off, to accumulate and start an arcing of the

current. This difficulty is also obviated by the employment of my improved air-cooling means, whereby the said detached particles of copper and carbon are not permitted to accumulate, but on the contrary are instantly drawn off and ejected.

A further object of my present invention is to improve the general construction, combination and arrangement of the component parts of a vacuum cleaner, whereby the cost of construction is reduced to the minimum, lightness and ease of manipulation is insured, and the greatest efficiency obtained.

Further objects and advantages of the hereinafter described structural arrangement and combination of cooperating parts, will be apparent to persons skilled in the art to which the present invention relates, and to these, in so far as they may be patentably novel, I lay claim the same as if herein set forth.

The invention will now be particularly described and set forth in the claims following.

In the accompanying drawings which form part of this application for Letters Patent, and whereon corresponding characters refer to like parts in the several different views:

Figure 1 represents a complete embodiment of my invention, so far as can be disclosed by a side elevation, the dust bag being omitted, and the operating handle being shown by dotted lines in its vertical or inoperative position, and

Fig. 2 is a longitudinal vertical section taken centrally through the cleaner frame, and disclosing all operative parts, with exception of the handle and dust bag aforesaid.

Reference being had to the drawings and numerals thereon, 1 indicates the hollow body, base or frame of cleaner, the same being a unitary structure of cast metal preferably aluminum because of its lightness, and in the main of circular form. This body or base casting 1 is surmounted by an annular flange 2 for the reception of a motor case or dome, as will later appear, and immediately below there is provided a circular fan compartment 3 of slightly increased diameter having an integral bottom 4, perforated by a relatively large suction port 5

concentrically located with relation to the said flange 2.

Beneath this fan compartment 3 there is an integral forwardly extending vacuum chamber 6 of outwardly diverging and substantially elliptical form, in open communication with a suitable intake-nozzle 7, which latter, in the present instance, is detachable, being secured by means of fastening screws 8, provided with a suitable agitating brush 9, and mounted upon supporting wheels 10.

Extending rearwardly and upward from the said fan compartments 3, and communicating directly therewith, is an integral discharge duct 11 constituting the only source of outlet for dust and sweepings, when the cleaner is in service, and like vacuum chamber 6 this duct 11 is of outwardly diverging and substantially elliptical form in cross section, is provided with oppositely disposed transversely arranged flanges 12, 12, each bearing a binding screw 13, and has a machined face to facilitate an air tight coupling with the neck-ring of a dust bag as will later appear.

At its front the main casting or base 1 is further provided with a flattened air passage 14 around the fan compartment 3, this passage having no communication with said compartment, but opening inwardly through flange 2 above it, and downwardly directly into the vacuum chamber 6 below said compartment, as clearly shown by Fig. 2 of the drawing.

Surmounting the cast base 1 above described, and fitting snugly within the up-standing annular flange 2 thereof, is an annular intermediate coupling or end cover 15 serving as a closure for a symmetrical motor case or dome 16, also annular in form and flanged at its base as at 17 to likewise fit within the upper periphery of said end cover. Interposed and clamped between the shouldered upper edge of the motor-case 16, end-cover or closure 15, and the flange 17 of said motor-case, is a thin annular steel disk or deflector 18 having a central opening 19 therethrough, and perforated at diametrically opposite points to neatly permit passage of binding screws or bolts 20, 20, by means of which the said motor-case 16, its end closure or cover 15, and the interposed deflector 18, are securely bound together.

These screws 20, 20, projecting upward through the body of closure 15 and deflector 18 enter the interiorly threaded hexagonal heads 21, of diametrically positioned lag screws 22, which latter in turn pass directly through the motor field magnets and are finally threaded into suitable lugs 23 cast upon and projecting radially from the inner surface of the motor case 16. The motor employed constitutes no part of the present invention, and so far as the present illustrations relate to the motor elements they may

be regarded as diagrammatic. It is of course centrally mounted in suitable bearings upon a main driving shaft 24, is provided with a suitable push plug 25 and electric connections 26 communicating with a source of electric power, and with suitable spring pressed carbon brushes (not shown) which latter are introduced through openings in the motor case 16 and backed up by screw retaining plugs 27.

Obviously also the motor casing 16 may be of any approved size and shape, the dome form shown, however, has been found both compact and convenient, and in any event this motor casing 16 is provided with suitable air inlets 28 for the admission of air currents to and around the motor when in operation. And the aforesaid casing 16 with its contents, as also end closure 15 with its interposed deflector 18, when assembled and positioned within flange 2 of base 1 as aforesaid, are there securely, but detachably retained by means of binding screws 29 screw threaded through opposite sides of the said base flange 2 at an angle, and bearing with their ends in oppositely disposed pockets formed in the periphery of closure 15.

As thus assembled it will be observed that motor shaft 24 projects through the bottom of closure 15 into the fan chamber 3 and is there rigidly secured to a suitable rotary blower or fan 30, adapted to be driven at great speed within said fan chamber 3, immediately above the suction port 5 before described.

Snugly fitting the machined face of discharge duct 11 is a correspondingly shaped neck-ring 31 provided with laterally disposed hook-lugs 32, and securely attached to the neck of a suitable dust-collecting bag 33. The said hook-lugs 32 are readily hooked over screws 13 projecting from lugs 12 of duct 11, and are there securely, but detachably, retained by agency of binding nuts 34 as shown by Fig. 1.

Beneath the discharge duct 11 there is permanently secured a caster wheel 35 serving as a support for the rear end of cleaner, and as a means of adjusting the pitch above the floor line of its opposite or nozzle end.

At approximately a central position upon opposite sides of the cleaner base 1 there is pivotally secured as at 36, 36, a forked or bifurcated end 37 of an operating or guiding handle 38 as shown by Fig. 1.

This being a description of my invention in the best form of embodiment at present known to me its use and operation may be briefly set forth as follows:

Rapid rotation of fan 30 within the fan compartment 3 immediately above suction port 5, causes a partial vacuum in the chamber 6 beneath, so that there is an inrush of dust and sweepings through intake nozzle 7

as the cleaner is advanced or retracted over surfaces to be cleaned in the well understood manner.

In the meantime the suction thus created below fan chamber 3 causes a very important and effective down-draft of cooling air which enters the motor case 16 through all air inlets 28. This cooling medium, thus automatically drawn into the motor casing, thereupon envelops the rapidly rotating motor, its field magnets, and adjacent parts, materially cooling same, and by reason of the central arrangement of outlet opening 19, in the otherwise closed deflector plate 18, the said air currents are necessarily concentrated more especially upon the moving motor parts which are ordinarily subjected to the serious consequences of overheating.

Having served its intended purpose the said cooling air currents, after passing deflector plate 18 into the interior of coupling or end cover 15, are drawn off through the single air passage 14 completely around the fan compartment 3 to the vacuum chamber 6, and thence out through discharge duct 11 with the dust and sweepings, it thus being impossible for back pressure to blow dust into the motor casing under any conditions of service, as might be the case if direct communication were established between the interior of motor case 16 and the fan compartment 3.

This air cooling process it will be observed is wholly automatic, it is also continuous and contributes materially to the life and efficiency of motors operating in domes so equipped.

Other objects and advantages of my present invention will be apparent to persons skilled in the art to which it relates, and having now described same what I claim and desire to secure by Letters Patent is:

1. In a vacuum cleaner the combination with a vacuum chamber, a fan compartment, and a motor case, the latter having no direct communication with said fan compartment,

of an air inlet to said motor case, and an outlet from said motor case comprising an air passage around the fan compartment into the vacuum chamber.

2. In a vacuum cleaner the combination with a vacuum chamber, a fan compartment, and a motor case the latter having no direct communication with said fan compartment, of air inlets to said motor case, and an outlet therefrom having no direct communication with the fan compartment comprising a relatively large air passage around the fan compartment into the vacuum chamber.

3. In a vacuum cleaner the combination with a vacuum chamber, a fan compartment, and a motor case having no direct communication with said fan compartment, of a ported deflector plate within said case, air inlets to the motor case, and an outlet therefrom comprising an air passage around the fan compartment into the said vacuum chamber.

4. In a vacuum cleaner the combination with a vacuum chamber, a fan compartment, and a motor case having no direct communication with said fan compartment, of a deflector plate within said case having a central opening therein, air inlets to the motor case, and an air outlet passage from beneath said deflector plate around the fan compartment into the said vacuum chamber.

5. In a vacuum cleaner the combination with a motor case, of a centrally ported deflector plate at the base of said case, a closure for the motor case below said deflector, an independent fan compartment, an underlying vacuum chamber, air inlets at top of the said motor case, and an air outlet passage from beneath said deflector plate around the fan compartment into the said vacuum chamber.

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

HARMON H. HARROLD.

Witnesses.

AGNES HARROLD,
LAURA HARROLD.