

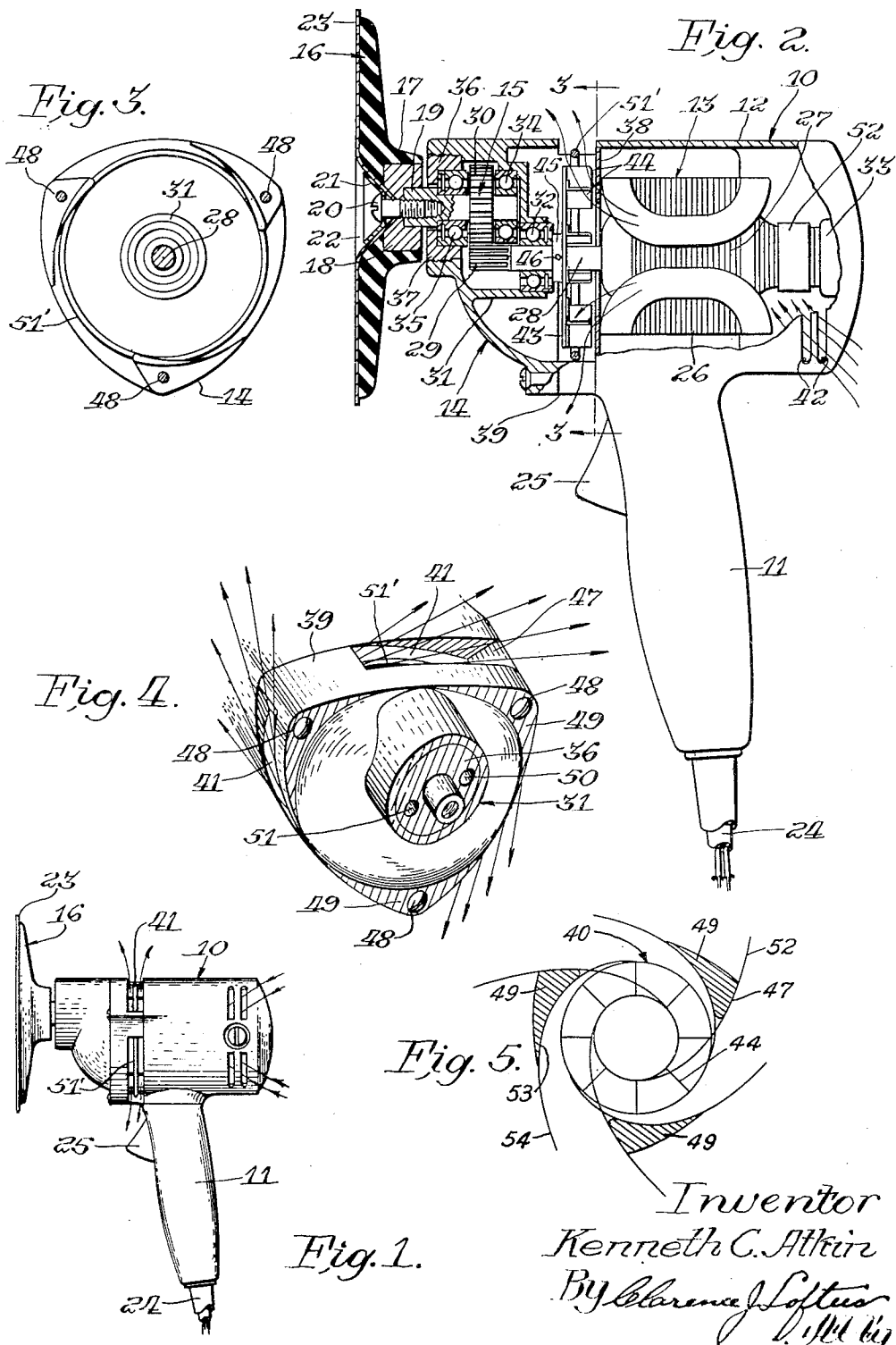
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MOTOR-DRIVEN TOOL

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MOTOR-DRIVEN TOOL

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This invention relates to a new and improved motor-driven tool and has for one of its principal objects the provision of means in a housing therefor to accelerate dissipation of motor heat.

An important object of this invention is to provide in a compact motor-driven hand-manipulated tool, means for efficiently cooling the motor without producing suction in the gear housing and relieve the motor of the objectionable suction load.

Another important object of this invention is the provision of cooling fan means for drawing air over the motor of a portable power-driven tool and for avoiding the setting up of undesirable air currents at the driven tool.

A further object of this invention is to provide means in the construction of the housing of a power-driven tool whereby air discharged through openings in the housing is directed laterally away from the housing.

A still further object of this invention is to provide means in a motor-driven tool which will cause quick dissipation of heat created by the driving motor.

Another and still further object is to provide a novel fan construction for use in combination with housings of power-driven tools in which the fan creates air currents in the motor portion of the housing and is barred from setting up air currents in the tool portion of the housing.

Other and further important objects will become apparent from the disclosures in the following specification and accompanying drawing.

In the drawing:

Figure 1 is a side elevational view of the portable motor-driven tool of this invention.

Figure 2 is an enlarged view similar to Figure 1 with portions thereof in section to show interior construction.

Figure 3 is a sectional view taken on the line 3-3 of Figure 2 with the motor cooling fan removed.

Figure 4 is a perspective view of a mid portion of the housing as shown in Figures 1 and 2.

Figure 5 is a diagrammatic illustration of the cooling fan and its housing, showing the spiral passages through which air is discharged.

As shown in the drawing:

The reference numeral 10 indicates generally a housing for a portable power-driven tool illustrated in Figures 1 and 2. The housing 10 is elongated and in normal use is disposed vertically. A handle 11 is integral with the housing 10 and extends laterally therefrom to enable an operator to easily move the power-driven tool to any desired location and to effect tool operation.

The upper portion 12 of the housing 10 carries an electric motor or the like 13 and the lower portion 14 of the housing 10 carries gear means 15 for imparting motor rotational drive to a tool.

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The drawing discloses the tool as a flexible plate 16 made of rubber, synthetic rubber or some like material. A hub 17 of the flexible plate is equipped with an integrally attached metal core 18 which is removably attached to a driven shaft 19 projecting downwardly from the bottom of the housing 10 by means of a screw or the like 20. A frusto-conical member 21 fits within a conical-shaped recess 22 in the center of the bottom of the flexible plate 16. Sandpaper or buffing sheets may be attached to the flexible plate 16 as work engaging surfaces. The screw 20 and the cone section 21 are removed and a corresponding circular sheet of sandpaper or the like 23 is placed face downwardly on the underside of the flexible plate 16. The conical sleeve 21 is then pushed up centrally thereof causing the paper to deform into the conical recess 22. The screw is then reinserted thus holding the conical sleeve 21 and the sandpaper sheet 23 against flexible plate 16 and the entire assembly to the driven shaft 19.

The handle 11 carries wires 24 for delivering electrical energy to the motor 13. A trigger type switch 25 is mounted in the handle in such a manner to permit convenient gripping and actuating by the operator. The motor 13 comprises a stationary field winding 26 and a rotatable armature 27. The armature is provided with a vertically disposed shaft 28 which extends down through the housing to the lower portion containing the gear means 15.

The gear means 15 includes a small spur gear 29 on the lower end of the motor-driven shaft 28 which meshes with a larger gear 30. The gear 30 is carried on the upper end of the tool driving shaft 19. An inner gear casing 31 carries a bearing 32 of the ball type which supports the motor shaft 28. The upper end of the armature or motor shaft 28 is journaled in a bearing 33 in the top of the housing 10. The tool driving shaft 19 is journally supported by spaced ball bearings 34 and 35 which flank the gear 30 on the upper and lower sides respectively. The bearing 35 is mounted in a bushing 36 which is threadedly removable from the lower end of the housing 10 as shown at 37. Access may be had to the interior of the gear housing 31 by removing the bushing 36. It should be understood that any desired gearing arrangement may be employed. In the arrangement shown the speed of the sanding tool 16 is considerably reduced through the driving from the small gear 29 to the large gear 30.

A partition 38 partially encloses the motor 13 in the upper portion 12 of the housing 10. This partition 38 has a large central opening which permits and provides for passage between the motor portion of the housing and that portion of the housing 10 positioned between the motor and the gear means. This central section of the housing is designated by the numeral 39 and

may be termed a fan housing as it encloses a fan 40 shown in detail in Figure 5. The housing 10 is circular at its top, and at the position of the fan 40 it is substantially triangular with three identical sides and adjoining vertices. The fan housing 39 is provided with similar openings 41 in each of the sides thereof. The openings 41 comprise the lower of spaced openings in the housing 10. The upper of the openings are shown at 42 around the upper annular end of the housing at a position above the motor field and armature and at approximately the level of the motor commutator 52.

The fan 40 is provided with a solid disc back 43 and carries radially disposed fan blades 44 spaced and welded or otherwise attached at regular intervals around the top surface thereof. The bottom of the disc 43 is equipped with a centrally located hub 45 which is mounted on the motor driven shaft 23 and held for rotation with the shaft by a pin or the like 46. The fan thus rotates upon operation of the motor 13, and as it impels air outwardly through the openings 41, it draws in cool air through the top openings 42 causing a continual passage of cooling air over the motor, thus maintaining it relatively cool. The solid backed fan forms a partition between the fan housing and gear housing and thus prevents drawing of air from the gear housing 14 in the same manner as air is drawn over the motor. This avoids creating a suction or partial vacuum in the gear housing and also an added motor load. An open backed fan would put considerable drag on the motor.

The fan housing and the gear case comprise a unit removable from the upper portion of the housing by screws 48 in the three enlarged lugs or ears 49 which have previously been described as the triangle vertices and functioning to redirect discharged air. As seen in Figure 3, the housing is entirely open between these lugs, which are of ample cross sectional area to give the required mechanical strength to the housing, but are shaped to provide streamlined spiral air passages which offer minimum resistance to the air flowing outwardly from the fan. The manner in which accelerated air discharge is obtained will be most easily understood by reference to Figure 5, from which it will be apparent that the lugs 49 are arranged with their inclined end walls 47 lying in the curve of a spiral 52 extending outwardly from the inner ends of the fan blades 44. The inner walls 53 of the lugs 49 are also of spiral form, lying in the curve of a spiral 54 extending outwardly from the periphery of the fan. The point of intersection of the spirals 52 and 54 is just outside of the diameter of the fan, so that the lugs 49 may be of ample cross section to hold the gear housing and tool and to accommodate the screws 48, yet the flow of air from the fan is substantially unrestricted. Thus, a maximum volume of air is moved through the motor with a minimum expenditure of power.

As best shown in Figure 4, the bushing 36 is provided with diametrically opposed recesses 59 and 51 in the lower surface thereof for engagement by a tool to effect easy removal thereof from the inner gear casing 31. It is to be noted, by referring to Figure 5, that the spirals or curved walls 52 and 53 form diverging air passages extending substantially transversely of the housing.

In operation, the portable power-driven tool is applied to a surface to be treated, whereupon the switch 25 is depressed into the handle 11 causing the motor to rotate the sanding or buff-

ing head 16 through the gear means 15. The motor is maintained cool by the fan 40 drawing air in through top openings 42 down over the motor and out through the streamlined shaped openings 41. These openings 41 are guarded by rigid wires 51' positioned around and within each of the openings to prevent undesired tampering and also accidental injuries.

Numerous details of construction may be varied throughout a wide range without departing from the principles disclosed herein, and I therefore do not propose limiting the patent granted hereon otherwise than as necessitated by the appended claims.

What is claimed is:

1. In a portable power-driven rotatable tool comprising a vertically disposed housing having spaced openings therein near the top and central portions, an electric motor positioned within the top portion of the housing and substantially between the spaced openings, said electric motor having a driven shaft extending downwardly in said housing, a motor cooling fan mounted on said driven shaft and positioned adjacent the openings near the central portion of the housing, whereby a current of air is drawn in through the top openings down over the electric motor and thrown outwardly through the central passages by the motor cooling fan, and gear means associated with the lower end of said driven shaft and said tool for imparting rotation thereto, said housing at its central portion having an external triangular shape with supporting bosses at the triangle vertices, said bosses having curved inner and outer surfaces to provide a plurality of diverging air passages of spiral shape extending substantially transversely of said fan shaft whereby air discharged therefrom is directed from the housing between said surfaces.

2. In a power-driven tool comprising a housing having spaced openings therein, a motor positioned in one end of said housing substantially between said housing openings, and a tool carried in the other end of the housing, means connecting the motor and the tool for imparting motor drive to the tool, a motor cooling fan positioned adjacent one of said housing openings and rotatable with said motor for drawing air in through the other of said openings over the motor and out of the openings adjacent the fan, said housing having a plurality of bosses spaced apart from each other around said fan for supporting said connecting means, said bosses having curved inner and outer surfaces to provide a plurality of diverging air passages of spiral shape extending substantially transversely of said housing whereby air discharged therefrom is directed from the housing between said surfaces.

3. In a power-driven tool having a housing with spaced openings therein, an electric motor in one end of the housing and a tool carried in the other end, gear means intermediate the motor and the tool, a fan positioned adjacent some of said spaced openings and between said motor and gear means, whereby a current of air is drawn in said housing through other of said openings down over the motor and thrown outwardly through said some openings, said fan having a solid back plate next to said gear means for shielding said gear means from the action of the fan, said housing at the position of said fan having an external triangular shape with bosses for supporting said gear means at the triangle vertices, said bosses having curved inner and outer surfaces to provide a plurality of diverging air

passages of spiral shape extending substantially transversely of said housing whereby air discharged therefrom is directed from the housing between said surfaces.

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