Baffle for Electric Lawnmower

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ABSTRACT

An electric lawnmower which includes a deck mounted on wheels and a blade mounted for rotation under the deck to cut grass. An electric motor is supported by the deck for rotating the blade upon actuation of a switch. The motor extends above the deck and is enclosed by a shroud. Air passages are defined between the bottom of the shroud and the deck to permit air to enter and be pulled through the motor by a fan for cooling purposes. A baffle is positioned between the motor and the passages to block any straight line communication therebetween so that the airflow is forced to turn and contaminants carried thereby are substantially removed before it enters the motor.

8 Claims, 3 Drawing Figures
BAFFLE FOR ELECTRIC LAWNMOWER

The present invention is directed to an improved electric lawnmower which includes means for preventing water or other contaminants from entering the electric motor.

Electric lawn mowers of the type which operate from line voltage supplied through an extension cord must be designed both to protect the operator against the possibility of failure of various parts of the insulation and also must be designed to prevent malfunction of the lawnmower itself due to such failure. Although the engineering design of present lawnmowers attempts to compensate for such possibilities, careless use of the mower by an operator can still cause a risk of shock or failure. A particularly hazardous example of this is the case of an operator who may use an electric lawnmower when the grass is wet or even when a light rain is falling. In this situation, water may be drawn into the lawnmower by the fan which produces a flow of cooling air through the motor. Water can short various parts of the motor and may even produce a shock hazard to the operator. Similarly, if dust or stone chips are drawn into the motor by the airflow, damage to the motor may result.

Accordingly, it is an object of this invention to provide an improved electric lawnmower which includes means for preventing the entry of contaminants into the electric motor.

Another object of this invention is the provision of an improved electric lawnmower including a baffle in the cooling airflow.

A further object of this invention is the provision of a new and improved baffle construction and airflow path for preventing the entry of contaminants into an electric lawnmower.

Further objects and advantages of this invention will become clear as the description and illustration thereof proceed.

Briefly, in accord with one embodiment of this invention, a rotary electric motor-driven lawnmower is provided which includes a deck mounted on wheels and adapted to be pushed over the ground by an operator. A blade is mounted for rotation beneath the deck for grass cutting in the usual manner. An electric motor is supported by the deck and extending above it. The rotary armature of the motor is connected to the blade to cause rotation when electrical energy is applied to the motor. The motor is enclosed within an insulating shroud to protect the motor and to prevent operator contact with live parts of the motor. In accord with this invention, a plurality of air passages are provided between the base of the shroud and the deck of the mower. A fan mounted on the armature draws air through the passages and through the motor to reduce the operating temperature thereof. In further accord with this invention, a baffle is provided which intercepts all straight line paths between the air passages and the entry slots at the top of the motor. Thus, the airflow is forced to turn a number of times before it travels from the passages to the motor so that substantially all contaminants such as water or dust carried by the airstream are prevented from entering the motor and causing damage.

In the drawing:

FIG. 1 is a perspective view of a lawnmower which incorporates the present invention;

FIG. 2 is a cross-sectional view of the lawnmower of FIG. 1 and illustrating the present invention; and

FIG. 3 is an exploded view of selected parts of FIG. 2.

In FIG. 1, the illustrated lawnmower 10 includes a deck 11 supported on wheels 12 and enclosing a blade 13 which is adapted to cut grass upon rotation. An electric motor is supported by the deck within an enclosure 14. Electrical energy is supplied to the motor via a cord 15 which extends upwardly along the handle 16 to switch 17 and then to an appropriate cord set 18 which is connected to an extension cord, not shown, which is in turn connected to a household outlet. The enclosure 14 is supported at one or more points 19 but a substantial portion of the structure, in combination with the upper surface of the deck 11, defines passages 20 through which cooling air is allowed to enter and pass to the motor for reducing the operating temperature thereof.

FIG. 2 illustrates the interior of the enclosure 14 of FIG. 1 and the mower construction contained therein. Specifically, the motor 25 which is illustrated is of the permanent magnet type having a permanent magnetic field 26 supported by a steel cylinder 27. The cylinder 27 is supported on an end casting 28 which is in turn mounted to the deck 11 by bolts 29. The upper end of the cylinder 28 supports an end bell 30 which carries a pair of brushes, not shown, to which electrical connection is made via a pair of wires, one of which is shown at 41, and which are connected to the lead 15. The end bell 30 and the steel cylinder 27 are connected to the end casting 28 via mounting bolts 32.

An armature 33 is provided to rotate within the permanent magnetic field. The armature is supported by bearings mounted respectively in the end bell 30 and in the end casting 28. Beneath the casting, the armature shaft is coupled to the blade 13 and it also carries a fan 34, the entire assembly being held together by a nut 35. Thus, when the switch 17 is activated, electrical energy is applied to the armature whereupon it rotates within the field, causing rotation of the fan 34 and the blade 13.

In accord with this invention, the fan 34 is of the centrifugal type and accordingly, it produces a downward airflow through the motor and through slots 36 in the end casting 28. To provide for this flow of air, entry slots 37 are provided in the end bell 30. In further accord with this invention, provision is made for removing contaminants from the airstream prior to its entry into the motor by eliminating any openings in the enclosure 14 except for the passages 20 adjacent its base. Due to this configuration, air drawn by the fan can only enter the enclosure 14 adjacent the base thereof and its path must then be upward along the outside of the motor until it enters the motor through slots 37. As previously noted, water or abrasive dust could easily be carried by the relatively large volume of air which passes through the motor.

To prevent this possibility, and to provide means for removing these contaminants from the airstream, a baffle 40 is provided in the path of the airstream to force the air to turn at least twice as it travels from the passages 20 to the slots 37. Since the contaminants are less easily turned than the airstream, the contaminants encounter the baffle and are substantially removed therefrom. In the preferred embodiment of this invention which is illustrated in FIG. 2, the baffle 40 is frustoconical in shape and has a small lower end 41 adjacent the motor and a larger upper end 42 which is closer to the enclosure 14. This conical shape increases the effect of the baffle on the airstream by forcing the air to turn by an angle greater than 90°. This further contributes to the removal of contaminants from the airflow. If desired, a simple cylindrical baffle could also be provided. In either case, a significant feature of this invention is the provision of the baffle 40 in such a position that it blocks all straight line paths from the passages 20 to the motor 25. Accordingly, both the main airstream which is passing toward the air slots 37 and air which may escape the main airstream are prevented from reaching either the outside or the inside of the motor without first passing through a relatively tortuous path which reduces the quantity of contaminants entrained therein.

FIG. 2 and FIG. 3 illustrate a further feature of this invention, namely, the provision of an additional layer of insulation by a flange 43 on the baffle which projects radially inwardly under the motor. Specifically, the cylinder 27 of the motor is supported on an insulating ring 44 which provides a barrier of insulation between the motor and its mounting. The radially inwardly extending flange 43 of the baffle 40 underlies this insulating ring 44 and also provides an insulating barrier between the motor 25 and the end casting 28. In this embodiment, the ring 44 may be a dielectric material such as nylon and the baffle 40 may be any thermoplastic material.

Alternatively, if the material is suitable, the baffle 40 may be manufactured, for example, by introducing a flange 44 in the structure similar to that of the ring 44 as an integral path of the flange 43. In either case, the portion of the baffle which extends under the motor forms a significant part of the insulating
barrier between the motor and accessible metal such as the deck 11.

In the foregoing description, reference has been made to a specific, preferred embodiment of this invention. It will be recognized by those skilled in the art, however, that many changes and modifications can be made without departing from the basic concept disclosed herein of providing a path for cooling air in an electric lawn mower which forces the air to travel upward from the bottom of the motor enclosure through a baffled path before it reaches this point of entry into the motor. In addition to the advantage of contamination removal provided by the baffle itself, the upward travel of the air from the passages to the top of the motor also contributes significantly to this process. Furthermore, the presence of the passages adjacent the bottom of the motor enclosure permit the escape of contaminants, particularly water, which might otherwise be retained within the enclosure and eventually cause corrosion or malfunction. As an additional feature, all of the electrical connections and wires of the motor are retained by the baffle in case of breakage and prevented from reaching the deck or other accessible metal. Accordingly, it is intended that the appended claims cover all changes and modifications from the specifically illustrated embodiment as may fall within the true spirit and scope of this invention.

We claim:

1. In an electric lawn mower including a deck mounted for movement over the ground; a blade mounted under said deck for cutting grass upon rotation thereof; an electric motor extending above said deck and coupled to said blade for causing rotation thereof upon energization; and an enclosure for said motor; the improvement comprising a plurality of passages defined by said enclosure for admitting air to cool said motor, said passages being located below the upper end of said motor; and a baffle located within said enclosure and disposed to block a straight line path from said passages to said motor to provide a curved path from said passages to said motor, whereby contaminants entering through said passages are substantially prevented from reaching said motor.

2. A lawn mower as claimed in claim 1 wherein said baffle is frustoconical in shape whereby air is forced to turn through an angle greater than 90° after passing through said passages.

3. A lawn mower as claimed in claim 2 wherein said passages are defined between the base of said enclosure and upper surface of said deck.

4. A lawn mower as claimed in claim 3 wherein said baffle extends from the base of said motor toward said enclosure, the small end of said baffle being adjacent said motor and the large end of said baffle being adjacent said enclosure.

5. A lawn mower as claimed in claim 4 wherein said motor comprises a stationary field supported by said deck, and wherein a flange on said baffle electrically insulates said field from said deck.

6. A lawn mower as claimed in claim 1 wherein all straight line paths from said passages to said motor are blocked by said baffle.

7. A lawn mower as claimed in claim 6 wherein said baffle substantially surrounds said motor.

8. A lawn mower as claimed in claim 6 wherein said baffle causes at least one extra turn through 90° in the normal flow path from said passages to said motor.

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