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(54) **Power tool**

(57) A power tool comprising a rotary motor (9) disposed in a housing (3), a transmission mechanism (8) attached to the rotary shaft of the rotary motor (9) and a fan (2) disposed on the rotary motor (9). The housing (3) near to the fan (2) defines a first air discharge port (1). The housing (3) outside the transmission mecha-

nism (8) defines a second air discharge port (4). An inner wall of the housing (3) between the first air discharge port (1) and the transmission mechanism (8) forms an air baffle (6). Cooling air may flow from the air baffle (6) to the second air discharge port (4) outside the transmission mechanism (8) to cool the transmission mechanism (8).

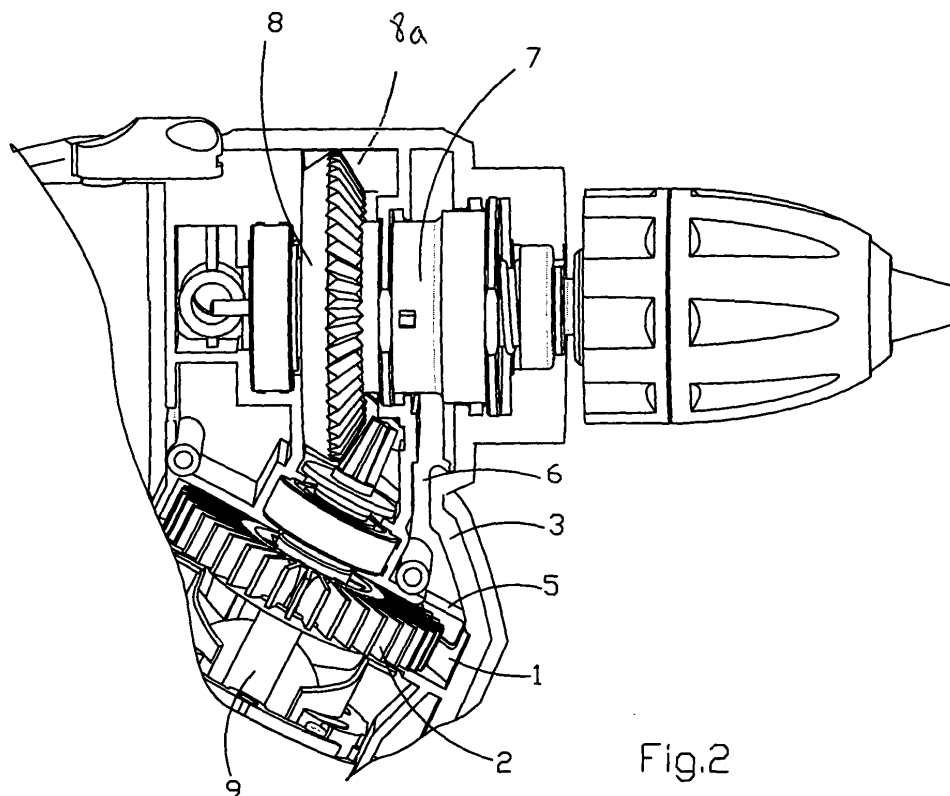


Fig.2

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Description

[0001] The present invention relates to a power tool having a novel cooling arrangement.

[0002] A conventional power tool has a fan disposed near to the motor so that the motor is easily cooled. However, in some power tools, the axis of the motor and the axis of the working piece form a certain angle which makes the transmission mechanism difficult to cool thereby resulting in the transmission mechanism reaching a high temperature during use.

[0003] The present invention seeks to improve the cooling arrangement in a power tool by providing a fan which not only cools the motor but also cools the transmission mechanism.

[0004] Viewed from a first aspect the present invention provides a power tool comprising:

- a housing;
- a rotary motor disposed in the housing and having a rotary shaft;
- a transmission mechanism in engagement with the rotary shaft;
- a fan for generating an airflow mounted radially on the rotary motor, wherein the housing near to the fan defines a first air discharge port for discharging air at the end of a first flow path and wherein the housing in close proximity to the transmission mechanism defines a second air discharge port for discharging air at the end of a second flow path,

wherein an air baffle between the first air discharge port and the transmission mechanism is adapted to direct air along the second flow path, wherein the air directed along the second flow path serves to cool the transmission mechanism in use.

[0005] The power tool in an embodiment comprises a motor disposed in a housing, a transmission mechanism attached to the rotary shaft of the motor and a fan disposed on the motor. The housing near to the fan defines a first air discharge port. The housing outside the transmission mechanism defines a second air discharge port. An inner wall of the housing between the first air discharge port and the transmission mechanism forms an air baffle.

[0006] The air baffle and the second air discharge port advantageously define a second flow path for cooling air generated by the fan to cool the transmission device.

[0007] The housing typically consists of a motor-containing part contiguous with a transmission mechanism-containing part. The axis of the motor-containing part may be substantially perpendicular to the axis of the transmission mechanism-containing part. The first air discharge port may be contained in the motor-containing part. The second air discharge port may be contained in the transmission mechanism-containing part. The transmission mechanism-containing part may be multiply ribbed. The motor-containing part is adapted

externally to be used as a handle. The transmission mechanism-containing part is adapted at an end to mount the cutting element externally.

[0008] Preferably the air baffle is an elongate interior wall of the housing.

[0009] Preferably the second air discharge port is disposed in the housing at a position effectively coincident with the intersection of the axis of the rotary motor and the axis of the transmission mechanism.

[0010] Preferably the second air discharge port is a plurality of discrete air vents which are disposed circumferentially in the housing in close proximity to the transmission mechanism. Particularly preferably the discrete air vents are substantially evenly disposed circumferentially in the housing in close proximity to the transmission mechanism. In this embodiment, the cooling air advantageously flows out uniformly from the second air discharge port and carries away heat from the transmission mechanism evenly.

[0011] Particularly preferably the discrete air vents are disposed circumferentially in the housing in a plane containing the intersection of the axis of the rotary motor and the axis of the transmission mechanism. Particularly preferably the discrete air vents are disposed circumferentially in the housing in a plane substantially containing the axis of the air baffle. Particularly preferably the discrete air vents are each disposed at the end of an axial rib in the exterior surface of the housing.

[0012] Preferably the first discharge port is disposed in at least a part of a portion of the housing which is substantially coplanar with the fan.

[0013] Preferably the first air discharge port is disposed in at least a part of a portion of the housing which is substantially coaxial with the fan.

[0014] Preferably the first air discharge port skirts the fan.

[0015] In a preferred embodiment, the transmission mechanism comprises:

- a rotary gear wheel intermeshed with the rotary shaft; and
- an elongate output shaft extending from the rotary gear wheel to a cutting element. Typically the angle between the axis of the rotary motor and the axis of the cutting element (and the transmission mechanism) is obtuse.

[0016] Preferably the elongate output shaft is downstream from the rotary gear wheel in the second flow path.

[0017] Preferably the second air discharge port is disposed in at least a part of a portion of the housing which is substantially coplanar with the elongate output shaft.

[0018] Preferably the second air discharge port is disposed in at least a part of a portion of the housing which is substantially coaxial with the elongate output shaft.

[0019] Preferably the second air discharge port skirts the elongate output shaft.

[0020] The first air discharge port may be a grille or mesh.

[0021] The fan may be mounted coaxially on the rotary motor.

[0022] Typically the air baffle extends from the first air discharge port to the second air discharge port. The axis of the air baffle may be substantially parallel to the axis of the motor-containing part of the housing.

[0023] The power tool may be a power drill or the like.

[0024] The present invention will now be described in a non-limitative sense with reference to the accompanying Figures in which:

Figure 1 is a perspective view of an embodiment of the power tool of the present invention;

Figure 2 is a partial view of the internal structure of the embodiment of the power tool of the present invention.

[0025] Referring to Figures 1 and 2, a power tool comprises generally a housing 3, a rotary motor 9 disposed in the housing 3 and a transmission mechanism 8 attached to a rotary shaft of the rotary motor 9. The transmission mechanism 8 comprises a rotary gear wheel 8a intermeshed with the rotary shaft and an elongate output shaft 7 extending from the rotary gear wheel 8a to a cutting element (not shown). The angle between the axis of the rotary motor 9 and the axis of the cutting element is obtuse.

[0026] The housing consists of a motor-containing part 3b contiguous with a transmission mechanism-containing part 3a which is multiply ribbed. The motor-containing part 3b is adapted externally to be used as a handle. The transmission mechanism-containing part 3a is adapted at an end 300 to mount the cutting element externally.

[0027] A fan 2 is integrally and coaxially disposed on the rotary motor 9. The housing 3 near to the fan 2 defines a first air discharge port 1 in the form of a grille contained in the motor-containing part 3b and the housing 3 defines a second air discharge port 4 contained in the transmission mechanism-containing part 3a outside the transmission mechanism 8. Referring to Figure 1, the second air discharge port 4 is a plurality of discrete air vents evenly arranged at the end of an axial rib in the housing 3 outside the transmission mechanism 8.

[0028] An inner wall of the housing 3 between the first air discharge port 1 and the transmission mechanism 8 forms an air baffle 6. The air baffle 6 serves to direct air along a path from the fan 2 to the second air discharge port 4.

[0029] During operation of the power tool, the rotary motor 9 is readily cooled due to the close proximity of the fan 2 and of the first air discharge port 1. Meanwhile, the flow of cooling air from the fan 2 to the second air discharge port 4 cools the transmission mechanism 8.

Claims

1. A power tool comprising:

- a housing (3);
- a rotary motor (9) disposed in the housing (3) and having a rotary shaft;
- a transmission mechanism (8) in engagement with the rotary shaft;
- a fan (2) for generating an airflow mounted radially on the rotary motor (9),

wherein the housing (3) near to the fan (2) defines a first air discharge port (1) for discharging air at the end of a first flow path and wherein the housing (3) in close proximity to the transmission mechanism (8) defines a second air discharge port (4) for discharging air at the end of a second flow path, wherein an air baffle (6) between the first air discharge port (1) and the transmission mechanism (8) is adapted to direct air along the second flow path, wherein the air directed along the second flow path serves to cool the transmission mechanism (8) in use.

2. A power tool as claimed in claim 1 wherein the air baffle (6) is an elongate interior wall of the housing (3).

3. A power tool as claimed in claim 1 or 2 wherein the second air discharge port (4) is disposed in the housing (3) at a position effectively coincident with the intersection of the axis of the rotary motor (9) and the axis of the transmission mechanism (8).

4. A power tool as claimed in any preceding claim wherein the second air discharge port (4) is a plurality of discrete air vents which are disposed circumferentially in the housing (3) in close proximity to the transmission mechanism (8).

5. A power tool as claimed in claim 4 wherein the discrete air vents are substantially evenly disposed circumferentially in the housing (3) in close proximity to the transmission mechanism (8).

6. A power tool as claimed in claim 4 or 5 wherein the discrete air vents are disposed circumferentially in the housing (3) in a plane containing the intersection of the axis of the rotary motor (9) and the axis of the transmission mechanism (8).

7. A power tool as claimed in claim 4, 5 or 6 wherein the discrete air vents are disposed circumferentially in the housing (3) in a plane substantially containing the axis of the air baffle (6).

8. A power tool as claimed in any preceding claim

wherein the first discharge port (1) is disposed in at least a part of a portion of the housing (3) which is substantially coplanar with the fan (2).

9. A power tool as claimed in any preceding claim wherein the first air discharge port (1) is disposed in at least a part of a portion of the housing (3) which is substantially coaxial with the fan (2). 5
10. A power tool as claimed in any preceding claim wherein the first air discharge port (1) skirts the fan (2). 10
11. A power tool as claimed in any preceding claim wherein the transmission mechanism (8) comprises: 15
- a rotary gear wheel intermeshed with the rotary shaft; and
- an elongate output shaft (7) extending from the rotary gear wheel to a cutting element. 20
12. A power tool as claimed in claim 11 wherein the elongate output shaft (7) is downstream from the rotary gear wheel in the second flow path. 25
13. A power tool as claimed in claim 11 or 12 wherein the second air discharge port (4) is disposed in at least a part of a portion of the housing (3) which is substantially coplanar with the elongate output shaft (7). 30
14. A power tool as claimed in claim 11, 12 or 13 wherein the second air discharge port (4) is disposed in at least a part of a portion of the housing (3) which is substantially coaxial with the elongate output shaft (7). 35
15. A power tool as claimed in any of claims 11 to 14 wherein the second air discharge port (4) skirts the elongate output shaft (7). 40

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