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(54) **CIRCULAR SAW**

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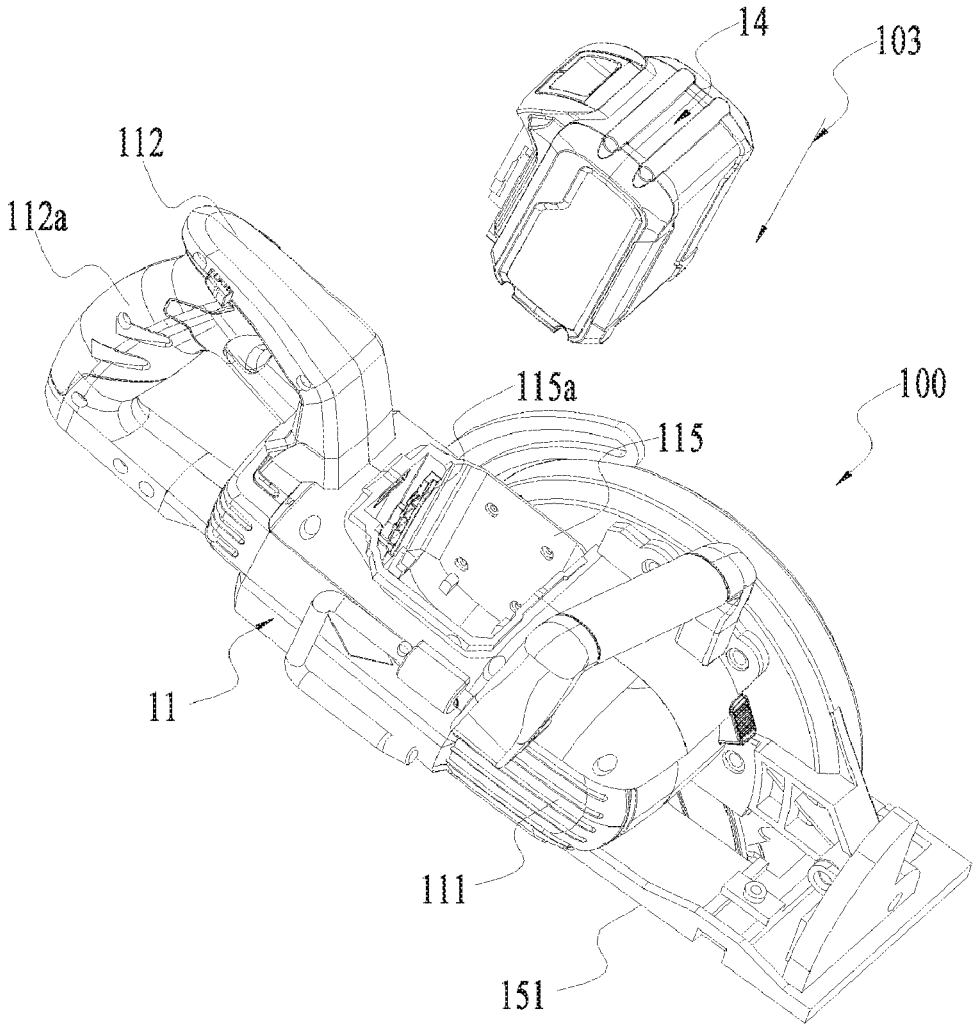
(57) **ABSTRACT**

A circular saw includes a cutting piece, a motor, a battery pack and an operating handle. The cutting piece is configured to cut a workpiece. The motor is configured to drive the cutting piece to rotate around a central axis. The battery pack is configured to supply power for the motor. The operating handle is used for a user to operate the circular saw. The motor, the battery pack and the operating handle are arranged at a same side of the cutting piece and are distributed substantially along a straight line. The battery pack is further arranged between the motor and the operating handle.



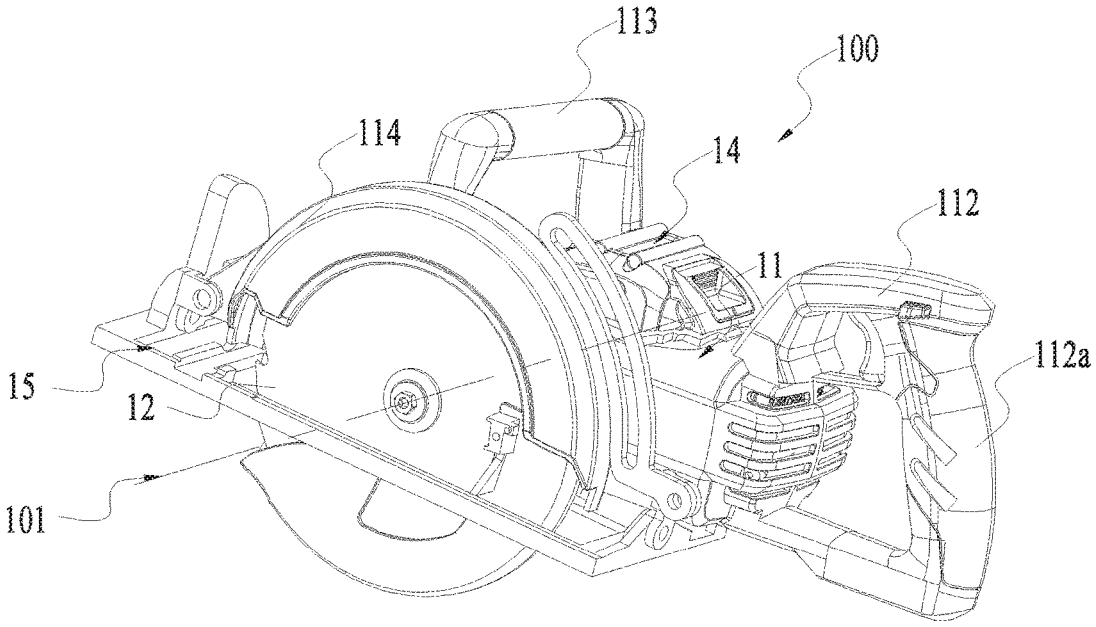


FIG. 1

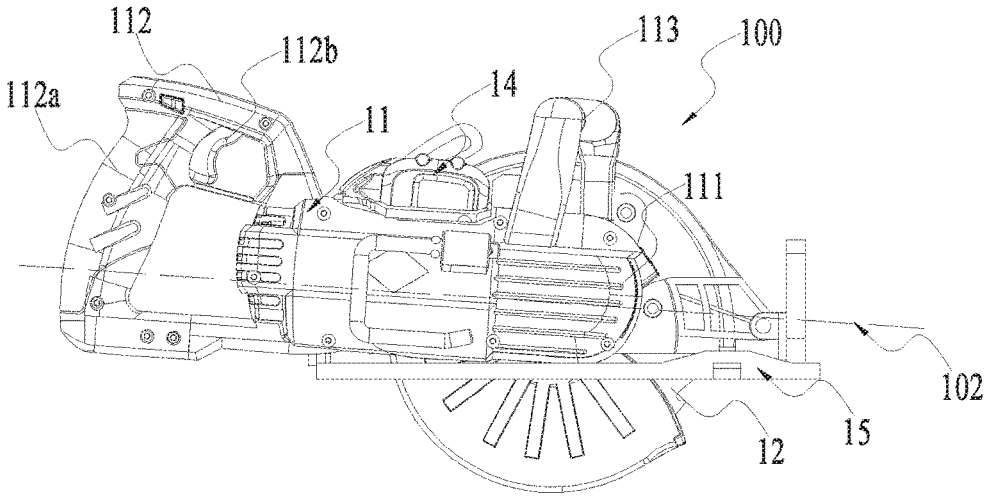


FIG. 2

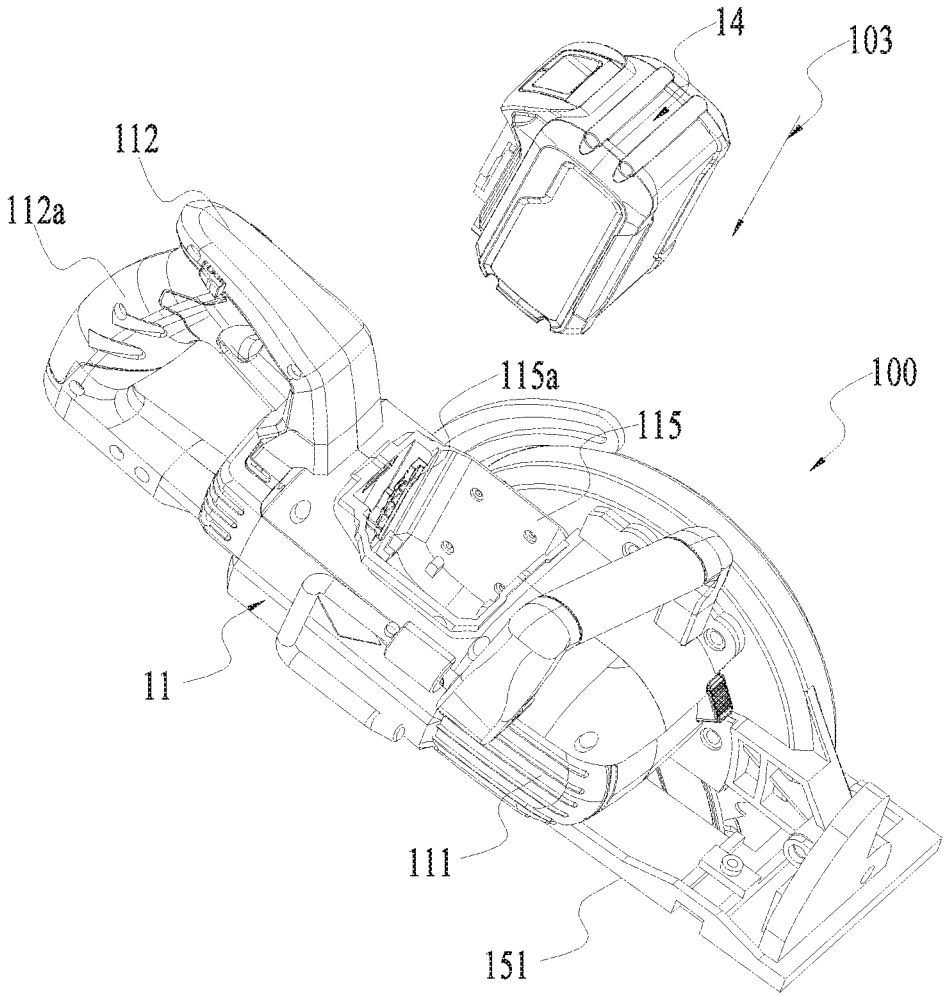


FIG. 3

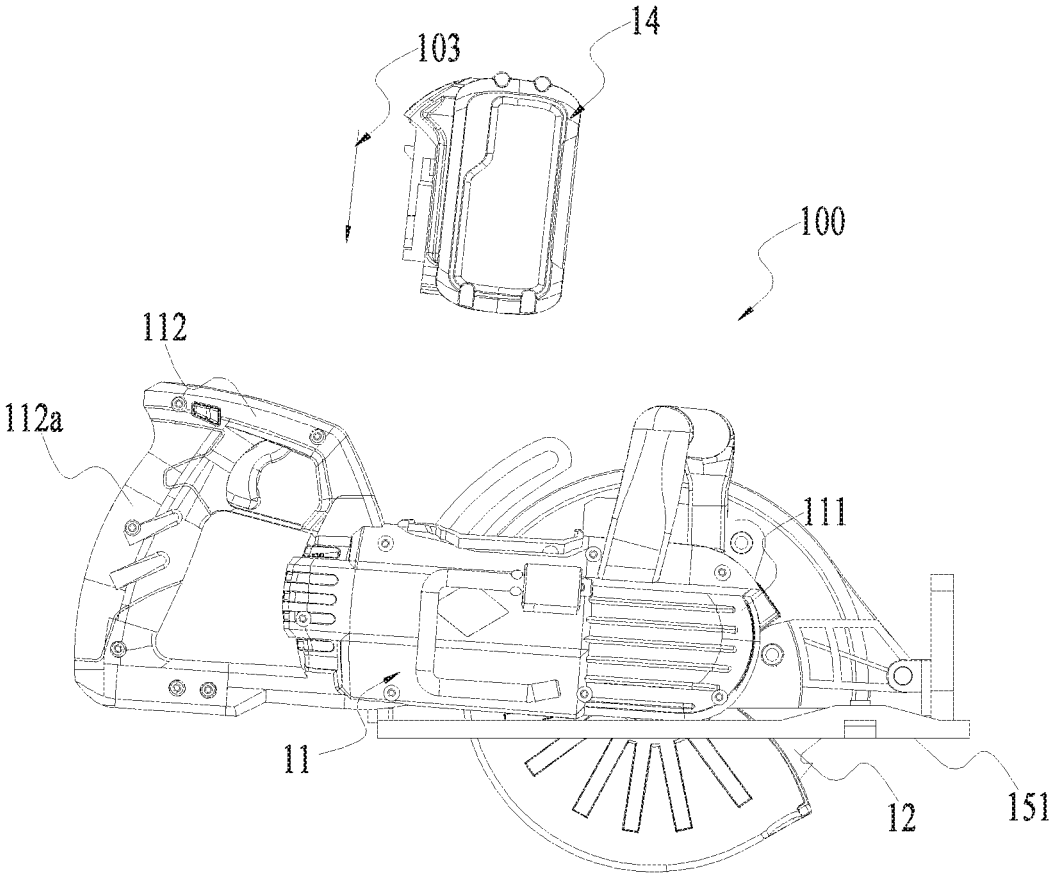


FIG. 4

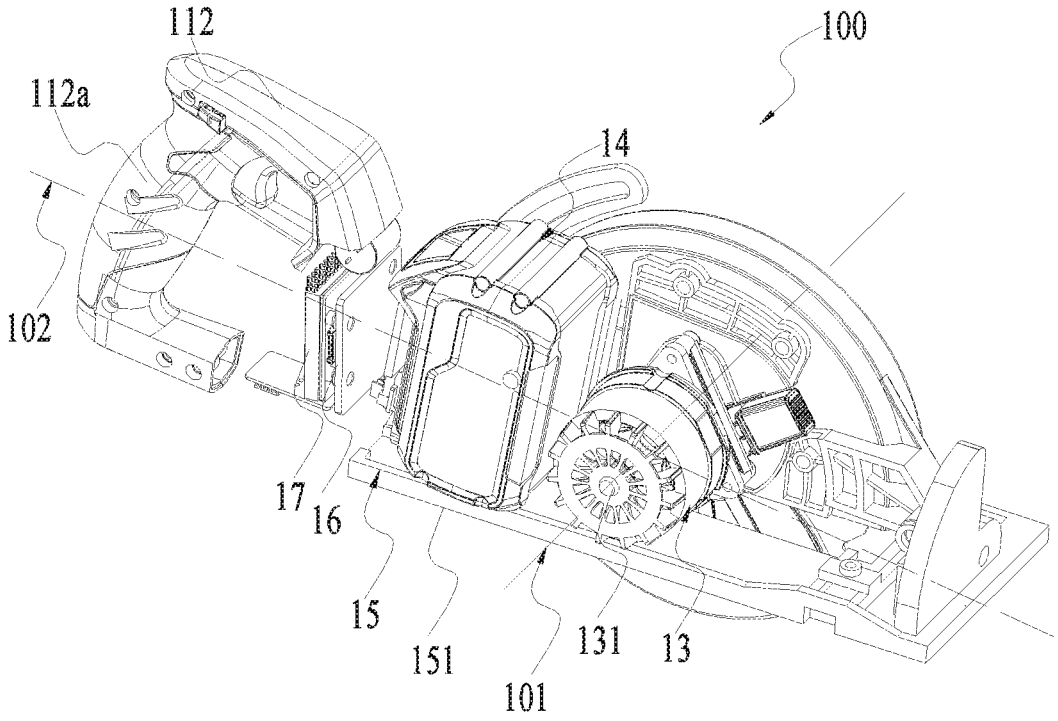


FIG. 5

CIRCULAR SAW

RELATED APPLICATION INFORMATION

[0001] This application claims the benefit of CN **201720083382.8**, filed on Jan. **22**, **2017**, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The subject disclosure relates to a circular saw, and particularly relates to an electric circular saw.

BACKGROUND

[0003] An electric circular saw is a power tool which performs sawing operation by driving a saw blade, and has characteristics of safety and reliability, high working efficiency and the like. The electric circular saw generally includes a housing, a motor, a bottom plate, an angle regulating mechanism, a depth regulating structure and a guide apparatus, wherein the housing is further formed with a handle for a user to grip. However, a direct current electric circular saw generally further includes a battery pack for supplying power for the motor. In an existing electric circular saw, the battery pack is generally arranged on a rear side of the handle, so that the entire machine has large size and heavy weight, causing inconvenience of use for the user.

SUMMARY

[0004] To solve defects of existing saws, the following describes a circular saw having a reasonable structure and a small size.

[0005] To realize the above purpose, the subject disclosure describes a circular saw that includes a cutting piece, a motor, a battery pack and an operating handle. The cutting piece is configured to implement a cutting function. The motor is configured to drive the cutting piece to rotate around a central axis. The battery pack is configured to supply power for the motor. The operating handle is used for a user to operate the circular saw. The motor, the battery pack and the operating handle are arranged at a same side of the cutting piece and are distributed substantially along a straight line. The battery pack is further arranged between the motor and the operating handle,

[0006] Further, the circular saw may include a housing configured to accommodate the motor, wherein the battery pack is detachably connected to the housing.

[0007] Further, the housing may be formed with the operating handle.

[0008] Further, the circular saw may include a housing formed with an inner cavity for accommodating the motor, wherein the housing is formed with an inserting groove for detachably inserting the battery pack outside the inner cavity.

[0009] Further, the housing may be formed with the operating handle.

[0010] Further, the inserting groove may be internally provided with a guide rib configured to guide the battery pack to insert the battery pack into the inserting groove along a first direction where the operating handle is formed with a grip portion used for the user to grip and wherein the grip portion is formed by extending substantially along a direction parallel to the first direction.

[0011] Further, the circular saw may include a housing configured to accommodate the motor; wherein the battery pack is detachably and slidably connected to the housing.

[0012] Further, the circular saw may include a supporting seat formed with a contact plane configured to contact with a to-be-cut piece wherein the motor is rotatably connected to the supporting seat and a direction along which the battery pack slides relative to the housing is obliquely intersected with the contact plane.

[0013] Further, the battery pack may be located between the operating handle and the central axis of the cutting piece.

[0014] Further, the cutting piece is preferably a circular saw blade.

[0015] The following thus describes a beneficial effect that the circular saw has a reasonable structure, a small size and a light weight.

BRIEF DESCRIPTION OF DRAWINGS

[0016] FIG. **1** is a three-dimensional diagram illustrating an exemplary circular saw;

[0017] FIG. **2** is a planar diagram illustrating the circular saw in FIG. **1**;

[0018] FIG. **3** is a three-dimensional diagram illustrating the circular saw in FIG. **1** when a battery pack is separated from a housing;

[0019] FIG. **4** is a planar diagram illustrating the circular saw in FIG. **1** when the battery pack is separated from the housing; and

[0020] FIG. **5** is a three-dimensional diagram illustrating the circular saw in FIG. **1** when part of the housing is removed.

DETAILED DESCRIPTION

[0021] A circular saw **100** shown in FIG. **1** may be specifically a tool for cutting. For example, the circular saw **100** is an electric circular saw.

[0022] As shown in FIG. **1** to FIG. **5**, the circular saw **100** includes a housing **11**, a cutting piece **12**, a motor **13**, a battery pack **14** and a supporting seat **15**, wherein the motor **13** is arranged in the housing **11**. For the electric circular saw, the cutting piece **12** may be specifically a circular saw blade, and the motor **13** is a motor for outputting power.

[0023] The housing **11** includes an accommodating portion **111** for accommodating the motor **13**. The accommodating portion **111** is formed with an inner cavity for placing the motor **13**. The housing **11** is further formed with an operating handle **112**, an auxiliary handle **113**, a protective cover **114** and other structures. The accommodating portion **111** is located at one side of the cutting piece **12**. The operating handle **112** is used for a user to operate the circular saw **100**. An operating switch **112***b* for controlling start and stop of the circular saw **100** is further arranged on the operating handle **112**. The auxiliary handle **113** is used for the user to assist in gripping the circular saw **100**. The protective cover **114** is used for at least partially encircling the cutting piece **12** to protect safety of environment and the user.

[0024] The cutting piece **12** is configured to implement a cutting function. The motor **13** is configured to drive the cutting piece **12** to rotate around a central axis **101**. The battery pack **14** is configured to supply power for the motor **13**, wherein the operating handle **112**, the motor **13** and the battery pack **14** are arranged at a same side of the cutting

piece **12** and are distributed along a first straight line **102**. For the electric circular saw, the operating handle **112**, the motor **13** and the battery pack **14** are further arranged at one side of both sides of the circular saw blade along a direction of the central axis **101**, wherein the battery pack **14** is further arranged between the motor **13** and the operating handle **112**. Further, the battery pack **14** is further arranged between the operating handle **112** and the central axis **101** of the cutting piece **12**. In this way, not only does the circular saw **100** occupy a small space, have a compact structure and a light weight, but also allows the user to balance performance of the circular saw **100** on the basis of not changing an operating habit. In addition, for the electric circular saw, the motor **13** may be an outer rotor brushless motor. In this way, a size of the accommodating portion **111** of the housing **11** is greatly reduced. At this moment, the housing **11** has a redundant space for placing the battery pack **14**. From a perspective of human engineering, the battery pack **14** is arranged between the operating handle **112** and the motor **13** so that a distance between the operating handle **112** and the auxiliary handle **113** is reasonable, and thus the user can grip the circular saw **100** more stably. In addition, the position of the battery pack **14** further ensures that a center of gravity of the circular saw **100** is located between the operating handle **112** and the auxiliary handle **113**, thereby further improving grip stability of the user.

[0025] Specifically, the housing **11** is formed with an inserting groove **115** outside the inner cavity. In other words, the housing **11** is sunk from an outer wall to form an inserting groove **115** which is open outwards. The inserting groove **115** is arranged between the operating handle **112** and the accommodating portion **111**. The inserting groove **115** is configured to detachably insert the battery pack **14** to the housing **11**. A guide rib **115***a* is further arranged in the inserting groove **115**. The guide rib **115***a* is configured to guide the battery pack **14** to slidably insert the battery pack **14** into the inserting groove **115** along a first direction **103**. The operating handle **112** is formed with a grip portion **112***a* used for the user to grip. The grip portion **112***a* is formed by extending substantially along a direction parallel to the first direction **103**. In this way, the user can detachably insert the battery pack **14** into the inserting groove **115** along a first direction **103** and, after the battery pack **14** is combined to the housing **11**, the battery pack **14** is located between the operating handle **112** and the motor **13**. In addition, the first direction **103** along which the battery pack **14** is inserted into the inserting groove **115** is basically parallel to the extension direction of the grip portion **112***a*, and is also perpendicular to the direction of the central axis **101** around which the cutting piece **12** rotates, thereby facilitating the user in inserting the battery pack **14** at the time of placing the circular saw **100** on a working table without lifting the circular saw **100**, and further facilitating user operation.

[0026] The motor **13** further includes a driving shaft **131** for outputting power. In the present example, the direction of the rotating axis of the driving shaft **131** is parallel to the direction of the central axis **101**. Of course, in other embodiments, the direction of the rotating axis of the driving shaft **131** can also be perpendicular to the direction of the central axis **101**. At this moment, a reversible transmission mechanism may be arranged between the motor **13** and the cutting piece **12**. In fact, as long as a position of the motor **13**, a position of the battery pack **14** and a position of the operating handle **112** are arranged basically in a straight line, it is regarded as a technical solution to the aforementioned problems.

[0027] The supporting seat **15** is configured to support the whole circular saw **100**. The supporting seat **15** is further formed with a contact plane **151** configured to contact with a to-be-cut piece **12**. A whole formed by the housing **11**, the motor **13** and the cutting piece **12** is located at an upper side of the contact plane **151**. The whole further forms a rotatable connection with the supporting seat **15**.

[0028] The direction of a first straight line **102** along which the operating handle **112**, the battery pack **14** and the motor **13** are arranged is further obliquely intersected with the contact plane **151**. The first direction **103** along which the battery pack **14** slides relative to the housing **11** is further obliquely intersected with the contact plane **151**, wherein an included angle formed by intersection of the direction of the first straight line **102** and the contact plane **151** is greater than 0 degree and less than or equal to 20 degrees. Further, the included angle is greater than 0 degree and less than or equal to 10 degrees. In this way, not only can the user conveniently grip the operating handle **112** to operate the circular saw **100**, but also the circular saw **100** realizes reasonable structure and good balance.

[0029] As shown in FIG. **5**, the circular saw **100** further includes a circuit board **16** configured to control the circular saw **100**, as well as a heat radiating fin **17** configured to radiate heat for the circuit board **16**, wherein the circuit board **16** and the heat radiating fin **17** are arranged between the operating handle **112** and the battery pack **14**. A position of the circuit board **16** is set in the direction of the first straight line **102** and a position of the heat radiating fin **17** is also set in the direction of the first straight line **102**. Namely, the motor **13**, the battery pack **14**, the circuit board **16**, the heat radiating fin **17** and the operating handle **112** are distributed substantially along the first straight line **102**. In this way, a heat radiating channel which can successively flow through the motor **13**, the battery pack **14**, the circuit board **16** and the heat radiating fin **17** basically along the direction of the first straight line **102** can be formed in the housing **11**, thereby improving heat radiating effect of the circular saw **100**.

[0030] The above shows and describes a basic principle, main features and advantages of the subject device. Those skilled in the art should understand that above described examples do not limit the invention hereinafter claimed in any form. Technical solutions obtained by adopting equivalent replacements or equivalent transformations are intended to fall within a protection scope of claimed invention.

What is claimed is:

1. A circular saw, comprising:

a cutting piece configured to cut a workpiece;

a motor configured to drive the cutting piece to rotate around a central axis;

a battery pack configured to supply power for the motor; and

an operating handle used by a user to operate the circular saw;

wherein the motor, the battery pack and the operating handle are arranged at a same side of the cutting piece and are distributed substantially along a straight line and the battery pack is arranged between the motor and the operating handle.

2. The circular saw according to claim 1, further comprising a housing configured to accommodate the motor wherein the battery pack is detachably connected to the housing.

3. The circular saw according to claim 2, wherein the housing is further formed with the operating handle.

4. The circular saw according to claim 1, further comprising a housing formed with an inner cavity for accommodating the motor wherein the housing is formed with an inserting groove for detachably inserting the battery pack outside the inner cavity.

5. The circular saw according to claim 4, wherein the housing is further formed with the operating handle.

6. The circular saw according to claim 4, wherein the inserting groove is internally provided with a guide rib configured to guide the battery pack to insert the battery pack into the inserting groove along a first direction, the operating handle is formed with a grip portion used for the user to grip, and the grip portion is extends substantially along a direction parallel to the first direction.

7. The circular saw according to claim 1, further comprising a housing configured to accommodate the motor wherein the battery pack is detachably and slidably connected to the housing.

8. The circular saw according to claim 7, further comprising a supporting seat formed with a contact plane configured to contact with the workpiece wherein the motor is rotatably connected to the supporting seat and a direction along which the battery pack slides relative to the housing is obliquely intersected with the contact plane.

9. The circular saw according to claim 1, wherein the battery pack is located between the operating handle and the central axis of the cutting piece.

10. The circular saw according to claim 1, wherein the cutting piece is a circular saw blade.

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