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### Abstract

The present invention provides an electric tool, comprising: a main body having a motor and a fan; at least one air pipe accessory mounted on the main body and positioned substantially in front of the main body; and a battery pack arranged to supply power to the motor; wherein: the battery pack is positioned substantially at a rear bottom position of the main body. During operation, the battery pack is arranged to lower the overall center of gravity of the main body and urge the air pipe accessory to approach the operating surface. The low center of gravity of the electric tool in the present utility model helps the user to move the electric tool during operation and prevent the air outlet/inlet of the air pipe accessory of the electric tool from leaving the operating surface, thereby enhancing work efficiency.

## **An Electric Tool**

### **Technical Field**

The present utility model relates to an electric tool, particularly to a battery-driven handheld blower-vacuum.

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### **Background Art**

The existing air blowers use electric fans to suck and exhaust air to purify air or tidy up an area. For example, during cleaning of a courtyard, a user may use an air blower with a long tube to blow leaves and debris to a side to facilitate cleaning. Cordless air blowers are more convenient for users and enable users to clean a larger space without the limitation of cable length.

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However, a cordless air blower needs a battery pack with certain capacity to supply power to the motor. In general, the battery packs for electric tools include a number of batteries with certain weights. In some designs, due to insufficient considerations given to the overall center of gravity of the electric tool, the connecting and mounting position of the battery pack may be facilitate an operation. Consequently the user may have to exert a larger amount of effort to operate the electric tool and thus the operation efficiency may be reduced.

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### **Summary of the Utility Model**

The embodiments of the present utility model provide an electric tool which overcomes the foregoing technical problem.

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According to one form of the present invention, there is provided an electric blower or vacuum tool, comprising:

a main body having a motor and a fan;

a first at least one air pipe accessory mounted on the main body and positioned substantially in front of the main body;

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a second air pipe accessory being mounted adjacent to the first air pipe accessory, wherein the second air pipe accessory is proximal to an operating surface when the electric blower or vacuum tool is in operation; and, includes a wheel arrangement arranged to rest on the operating surface when the electric blower or vacuum tool is in operation; and,

a battery pack arranged to supply power to the motor;

wherein the battery pack is positioned adjacent to the motor substantially at a rear bottom position of the main body.

- 5 On the one hand, the present utility model provides an electric tool, comprising: a main body having a motor and a fan; at least one air pipe accessory mounted on the main body and positioned substantially in front of the main body; and a battery pack arranged to supply power to the motor; wherein: the battery pack is positioned substantially at a rear bottom position of the main body.

Preferably, during operation, the battery pack is arranged to lower an overall center of gravity of the main body and urge the air pipe accessory to approach an operating surface.

- 10 Preferably, the battery pack is positioned substantially under the motor.

Preferably, the battery pack is positioned adjacent to the motor.

Preferably, the battery pack is substantially parallel with the motor.

Preferably, the battery pack is arranged to be parallel with the at least one air pipe accessory mounted on the main body.

- 15 Preferably, the main body is provided with a handle at a position substantially above the main body.

Preferably, the handle, the motor and the battery pack form a configuration axis substantially parallel with the direction of gravity.

- 20 Preferably, the motor and the fan define an operation axis parallel with the motor shaft and the operation axis is substantially perpendicular to the configuration axis.

Preferably, the battery pack is arranged to be mounted on the main body and flush with the motor.

Preferably, the battery pack is detachably mounted on the main body.

- 25 Preferably, the main body is provided with a battery pack slot having a battery pack locking mechanism arranged to lock the battery pack.

Preferably, the battery pack slot is provided on a casing of the main body and is positioned substantially at the rear bottom of the main body.

Preferably, the electric tool is at least one of air blower, suction fan, vacuum cleaner and dual-purpose blower-vacuum.

- 5 The electric tool in the present utility mode therefore has many advantages. One of the advantages is that the battery pack is positioned substantially under the motor, so the overall center of gravity of the main body won't move to an unfavorable position, such as: above, behind, or on the left/right side of the motor. Disposing the battery pack in a position substantially under the motor can further lower the overall center of gravity of the main body, which is more favorable for the user in moving the electric tool during operation and avoids the air inlet/outlet of the air pipe accessory of the electric tool being moved away the operating surface, thus enhancing work efficiency. In addition, the battery pack of the electric tool in the present utility model is positioned adjacent to motor. This enable the structure and the components of the main body more compact with a better weight distribution, so as to further lower the overall center of gravity. In addition, the batteries are substantially at the rear bottom of the main body, which makes the overall structure of the electric tool more concise and compact. The operation is made easier.

### Description of the Drawings

- 20 The present utility model will now be described by referring to the rest part of this description and accompanying drawings from which its performance and advantages will be evident. In these drawings, a same component has a same mark number. In some conditions, a sub-sign is put behind a mark number and a hyphen to denote one of many similar components. When a mark number is mentioned, while none of the known sub-signs is particularly stated, it refers to all these similar components.

- 25 Fig. 1 shows an electric tool according to an embodiment of the present utility model;

Fig. 2 shows an electric tool shown in Fig. 1, wherein the operating mode of the electric tool is suction mode;

Fig. 3 shows an electric tool shown in Fig. 1, wherein the operating mode of the electric tool is blowing mode;

- 30 Fig. 4 shows a schematic diagram for assembling the battery pack onto the electric tool according to an embodiment of the present utility model;

Fig. 5 shows a rear bottom view of the electric tool shown in Fig. 1;

Fig. 6 shows an electric tool shown in Fig. 5, wherein the battery pack is removed;

Fig. 7 shows an enlarged view of the battery pack slot of the electric tool shown in Fig. 1;

Fig. 8 shows an enlarged view of the battery pack of the electric tool shown in Fig. 1.

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### **Detailed Description of the Embodiments**

From the following description, it is shown the benefits and advantages provided by the embodiments of the present utility model.

10 With reference to Fig. 1, the present utility model provides an electric tool, comprising: a main body having a motor and a fan; at least one air pipe accessory mounted on the main body and positioned substantially in front of the main body; and a battery pack arranged to supply power to the motor; wherein the battery pack is positioned substantially at a rear bottom position of the main body.

15 As shown in Fig. 1, the electric tool may be a blower-vacuum 100, the main body 102 of the blower-vacuum has a motor 104, the motor 104 is connected to a fan (not shown) and arranged to drive the fan. The motor 104 and the fan define an operation axis (axis A). The main body 102 of the blower-vacuum also provided with a handle 106 for the user to hold the blower-vacuum. The handle 106 is positioned substantially above the main body 102 to facilitate a user operation. Preferably, the handle 106, the motor 104 and battery pack 108 are arranged to form a configuration axis (axis B) substantially parallel with the direction of gravity such that the  
20 overall center of gravity of the main body is beneath handle 106. The operation axis (axis A) and the configuration axis (axis B) are substantially perpendicular to each other, so that the overall center of gravity of main body 102 can be maintained below handle 106 during operation. Optionally, the main body 102 is provided with an auxiliary handle so that the user may operate the electric tool 100 with two hands.

25 Air pipe accessories 110, 112 may be positioned substantially in front of the main body 102, and the air pipe accessories 110, 112 are connected to the main body 102 in fluid communication. Preferably, the air pipe accessories 110, 112 are detachable and may include at least one of an air suction pipe, a blow pipe or other fittings to communicate air flows. As shown in Fig. 2 and Fig. 3, the blower-vacuum 100 may be arranged to work in a suction mode 200 with a detachable air  
30 suction pipe, or may be arranged to work in a blowing mode 300 with a detachable blow pipe. Air is sucked into main body 102 of the blower-vacuum via the air pipe accessory, such as from an end of the air suction pipe 110, and is further transferred to air outlet section 120 and/or blow

pipe 112 to complete the entire air circulation. Optionally, the main body 102 of the blower-vacuum is provided with a cover 114. When the main body 102 of the blower-vacuum is not connected to any air pipe accessory, the accessory opening 122 of the main body 102 is closed to prevent the user from accessing internal components (such as the fan, not shown) during operation and being injured.

The blower-vacuum 100 is configured with a battery pack 108 which supplies power to drive the blower-vacuum 100. The battery pack 108 is configured substantially at the rear bottom of the main body 102. Preferably, the battery pack 108 is configured in a position adjacent to the motor 104, substantially under motor 104, and is connected to the motor 104 and supply power to the motor 104. The motor 104 drives the fan to generate suction pressure so that air enters the main body via the end of air pipe accessory 110 or the openings on cover 114 (not shown).

The battery pack 108 is positioned near the motor 104 such that the weight distribution of all the components on main body 102 is more compact, thus lowering the overall center of gravity of the main body 102 and urging the air pipe accessories 110, 112 towards the operating surface. As shown in Fig. 1, the battery pack 108 may be arranged to be parallel with at least one of air pipe accessories 110, 112 positioned on main body 102. The battery pack 108 and central axis of the accessory opening 122 on the main body are arranged to be parallel to each other relative to the axis A. Thus, handle 106, motor 104 and battery pack 108 are arranged to form a configuration axis (axis B) substantially parallel with the direction of gravity. When the user lifts handle 106, the ends of air pipe accessories 110, 112 naturally face the ground and are ready for suction. No extra effort is needed to balance the position of the air pipe accessories. Optionally, the battery pack 108 may also be arranged to be parallel with the motor 104.

If the battery pack 108 is positioned away from the configuration axis (axis B), the weight of the battery pack 108 will offset the overall center of gravity of the main body 102 from axis B, thus intensifying the swing of the air pipe accessories 110, 112 during operation or making the pipes deviate from the suction object, causing difficulty in operation. Moreover, extra effort may be required to adjust the position of the blowing/suction openings of the air pipe accessories 110, 112 to align with the suction object or the blowing direction.

Preferably, the battery pack 108 is configured on the main body 102 in a detachable manner and the main body 102 has a battery pack slot 116 to assemble the battery pack 108. The battery pack slot 116 is positioned on the casing substantially at the rear bottom of the main body 102. As shown in Fig. 1 and Fig. 4~Fig. 7, beneath the motor and at the rear bottom of the main body, there is provided a battery pack slot 116, which has a battery pack locking mechanism arranged to lock the battery pack. The battery pack locking mechanism may comprise a notch 702, a

locking strip 704 or/and a fastener 706 (as shown in Fig. 7) matching the enclosure of the battery pack to lock the position of battery pack 108 in a form of snap-fit or engagement or any other form. Optionally, other types of locking components may also be applied in the embodiments of the present utility model, such as: buckles and sliding switches, etc. Optionally, the battery pack slot 116 may also be a component with a cavity to receive batteries, or a component with a cover to cover battery pack slot 116 and avoid displacement or loosening of battery pack 108. As shown in Fig. 4, battery pack 108 may be inserted or fixed in the battery pack slot 116 in a slidable manner and locked by the battery pack locking mechanism to a position beneath the motor 104 to prevent displacement or loosening of battery pack 108 during operation, which may cause power interruption. When the power of battery pack 108 is fully discharged, the user may unlock the locking mechanism and remove battery pack 108 for replacement or recharging, or it may be recharged by the charging module provided by the body of the electric tool.

Optionally, the battery pack 108 may be mounted to the main body in an undetachable or integral manner.

On the other hand, the battery pack 108 may also be positioned on the main body 102 and flush with the motor 104. In other words, at least one surface of battery pack 108 is flush with at least one surface of the motor 104, or battery pack 108 is positioned to be flush with motor 104. This design can further maintain the center of gravity of main body 102 on axis B, or a position below the handle 106.

Preferably, battery pack 108 may be a rechargeable battery pack, a disposable battery pack, a detachable battery pack or a fixed battery pack. Other equivalents may also be used without departing from the essence of the present utility model.

As shown in Fig. 1, when the user operates the electric tool 100, uses it as a blower for example, he may hold handle 106 and meanwhile put the roller 118 connected to a blow pipe on the operating surface (such as a ground surface), and move the electric tool 100 with the assistance of the roller 118 to facilitate the cleaning work. The motor in the main body 102 of the electric tool 100 is heavier than other components. The overall center of gravity of the main body 102 is at the motor 104, while the battery pack 108 connected to the main body 102 and beneath the motor 104 also has certain weight, so it may lower the overall center of gravity of the main body 102 and make the roller 118 cling to the ground during operation. Therefore, the blow pipe 110 may be maintained close to the ground and may not leave the ground due to the movement of main body 102.

When using the electric tool 110 as a suction fan or a vacuum cleaner 200, the blow pipe 112 may be removed, only the suction pipe 110 is connected to the main body 102 and a collection bag may be connected to the air outlet 120 of the main body 102 to collect sucked dust and/or debris. Likewise, as heavy components on the main body 102, such as: the motor 104 inside the main body and the battery pack 108 connected to the main body 102 and beneath the motor 104, are all below the handle 106, the user may keep the open end of the suction pipe 110 close to the ground with the help of the center of gravity of main body 102. It may not leave the ground due to the movement of main body 102.

If the battery pack is arranged in a position of the main body rather than the most preferable mounting position provided in these embodiments of the present utility model, for example behind the motor, when the user holds and operates the electric tool, the battery pack with certain weight will move the overall center of gravity of the main body of the electric tool backwards. Due to the weight of the battery section, the electric tool as a whole is liable to rotation and consequently the air inlet/outlet of the blow/suction pipe of the air pipe accessory is liable to being lifted and leaving the ground. The user has to exert extra force to overcome the backward movement of the overall center of gravity of the main body in order to prevent the air outlet/inlet from leaving the ground due to the overall rotation of the electric tool. If the battery pack is arranged on the left or right of the motor, the overall center of gravity of the main body will move to left or right side and the electric tool will be liable to rotating leftwards or rightwards to bring the air outlet/inlet off the ground, causing difficulty to user's operation. Therefore, arranging the battery pack in a position substantially at the rear bottom of the main body, or a position substantially beneath the motor may keep the center of gravity of the main body at or below the motor and effectively avoid unnecessary rotation of the electric tool during operation.

Those skilled in the art may know that in addition to blower-vacuum mentioned in the embodiments of the present utility model, the electric tool provided in the present utility model may also be other types of electric tools, including but not limited to: dual-purpose blower-vacuum, air blower, vacuum cleaner, suction device, air blower, suction fan, leaf blower, electric drill, polishing machine, cutting machine, electric hammer and electric saw, etc.

Therefore, after introduction of a few embodiments, those skilled in the art should know various modifications, different structures and equivalents all may be used without departing from the essence of the present utility model. Accordingly, the foregoing descriptions shall not be deemed as limitations to the scope of the present utility model determined in the claims of this application.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word “comprise” or variations such as “comprises” or “comprising” is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of  
5 further features in various embodiments of the invention.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An electric blower or vacuum tool, comprising:  
a main body having a motor and a fan;  
a first t least one air pipe accessory mounted on the main body and positioned substantially in  
5 front of the main body;  
a second air pipe accessory being mounted adjacent to the first air pipe accessory, wherein the  
second air pipe accessory is proximal to an operating surface when the electric blower or  
vacuum tool is in operation; and, includes a wheel arrangement arranged to rest on the operating  
surface when the electric blower or vacuum too is in operation; and,  
10 a battery pack arranged to supply power to the motor;  
wherein the battery pack is positioned adjacent to the motor substantially at a rear bottom  
position of the main body.
2. An electric blower or vacuum tool in accordance with claim 1, wherein the battery pack  
15 is arranged to be mounted on the main body in a position substantially under the motor and is  
flush with the motor.
3. An electric blower or vacuum tool in accordance with claim 1 or 2, wherein the main  
body is provided with a handle at a position substantially above the main body; wherein the  
20 handle is positioned together with the motor and the battery pack so as to align with a  
configuration axis arranged to be substantially parallel with the direction of gravity when the  
electric blower or vacuum tool is in use.
4. An electric blower or vacuum tool in accordance with claim 1, 2 or 3, wherein the second air  
25 pipe accessory is arranged to provide a blowing function and at least one air pipe accessory has  
a wheel arrangement arranged to rest on an operating surface.
5. An electric blower or vacuum tool in accordance with any one of the preceding claims,  
wherein the battery pack is substantially parallel with the motor.

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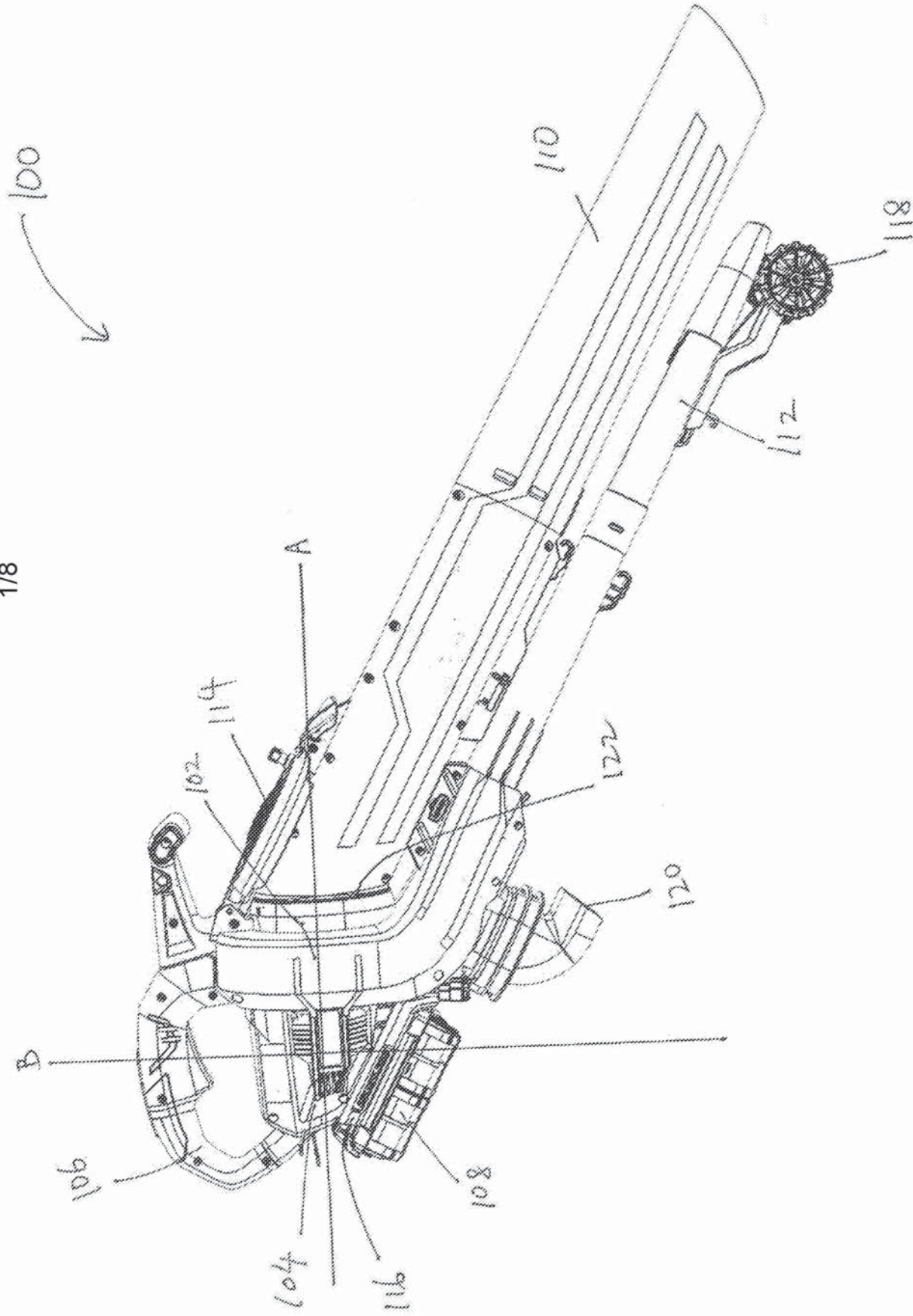


Figure 1

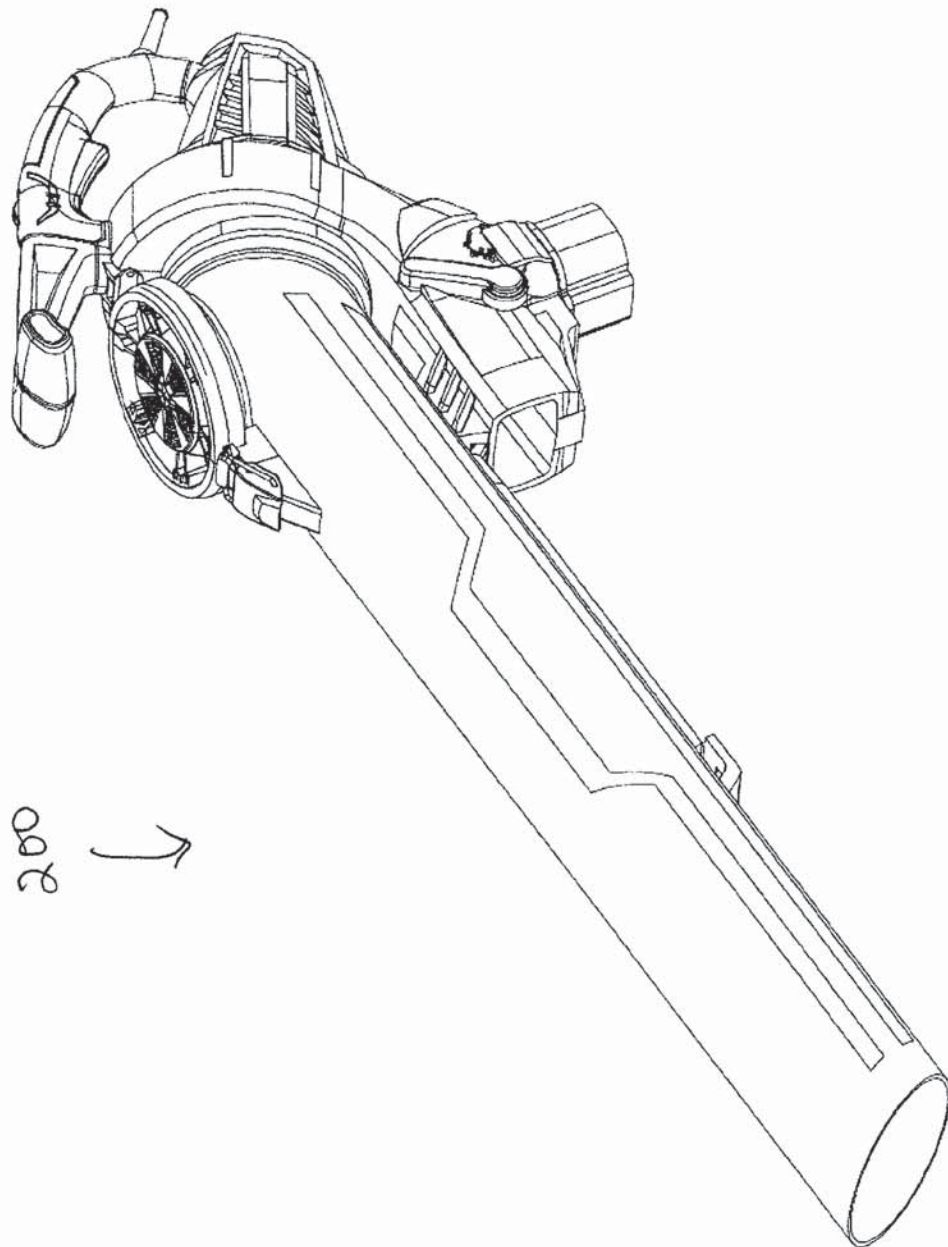


Figure 2

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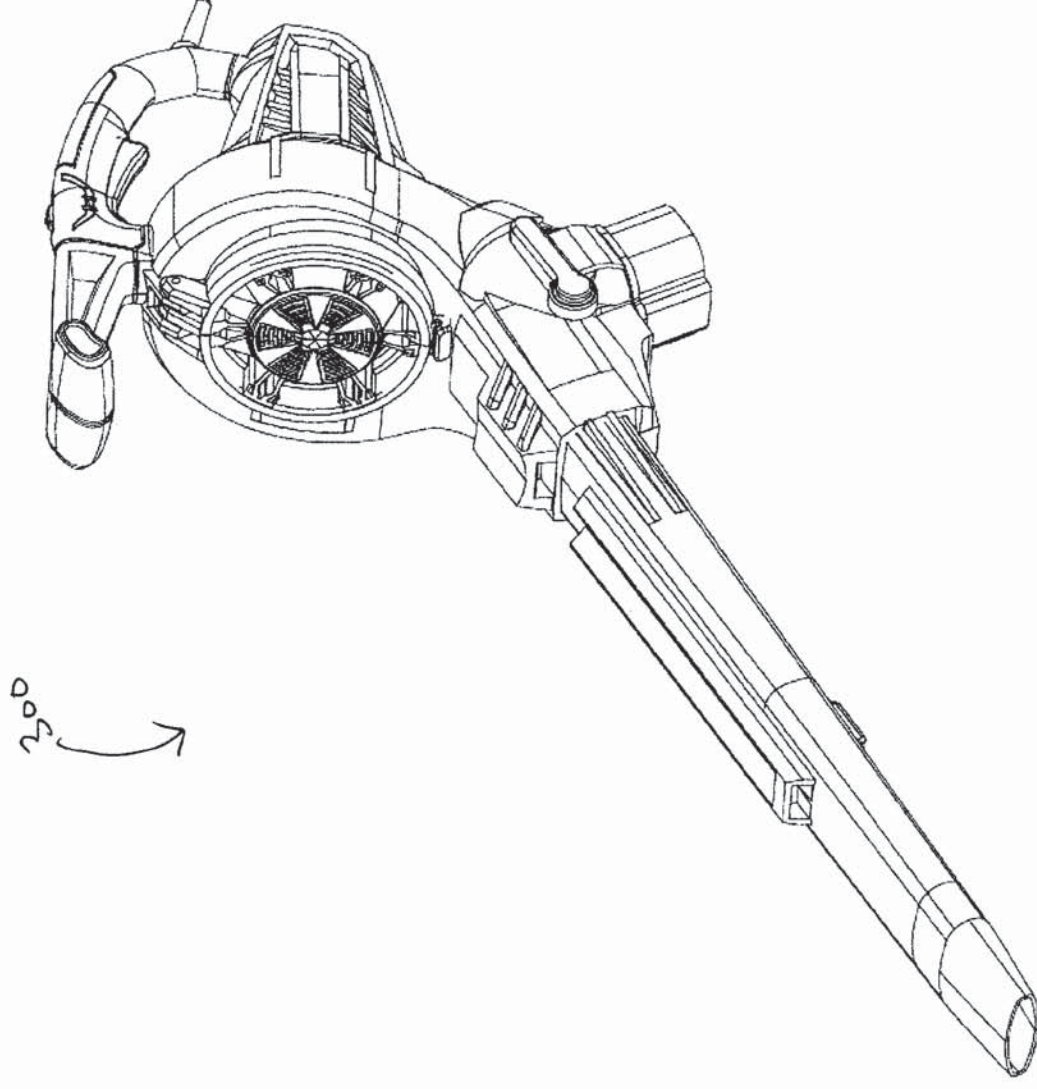


Figure 3

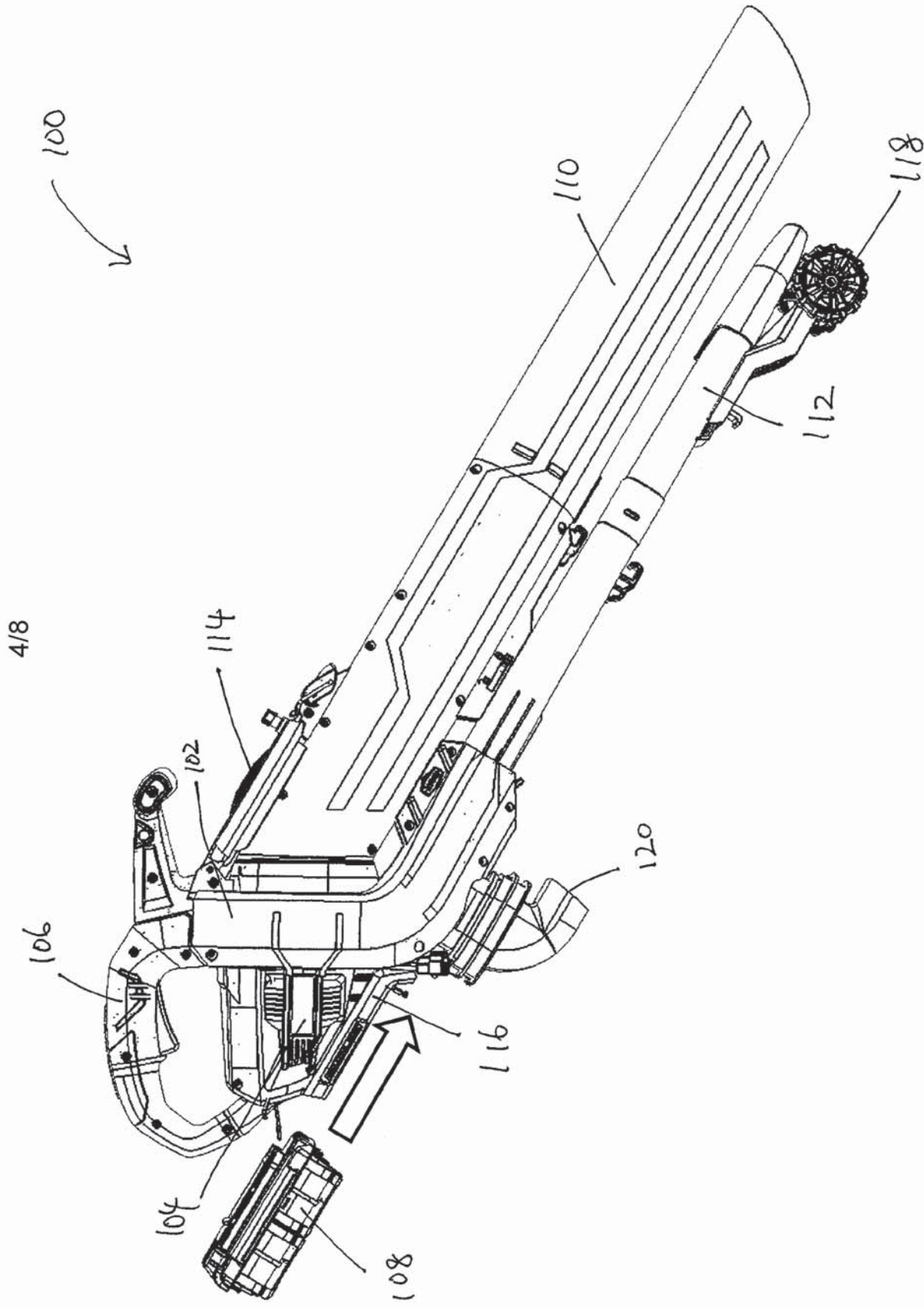


Figure 4

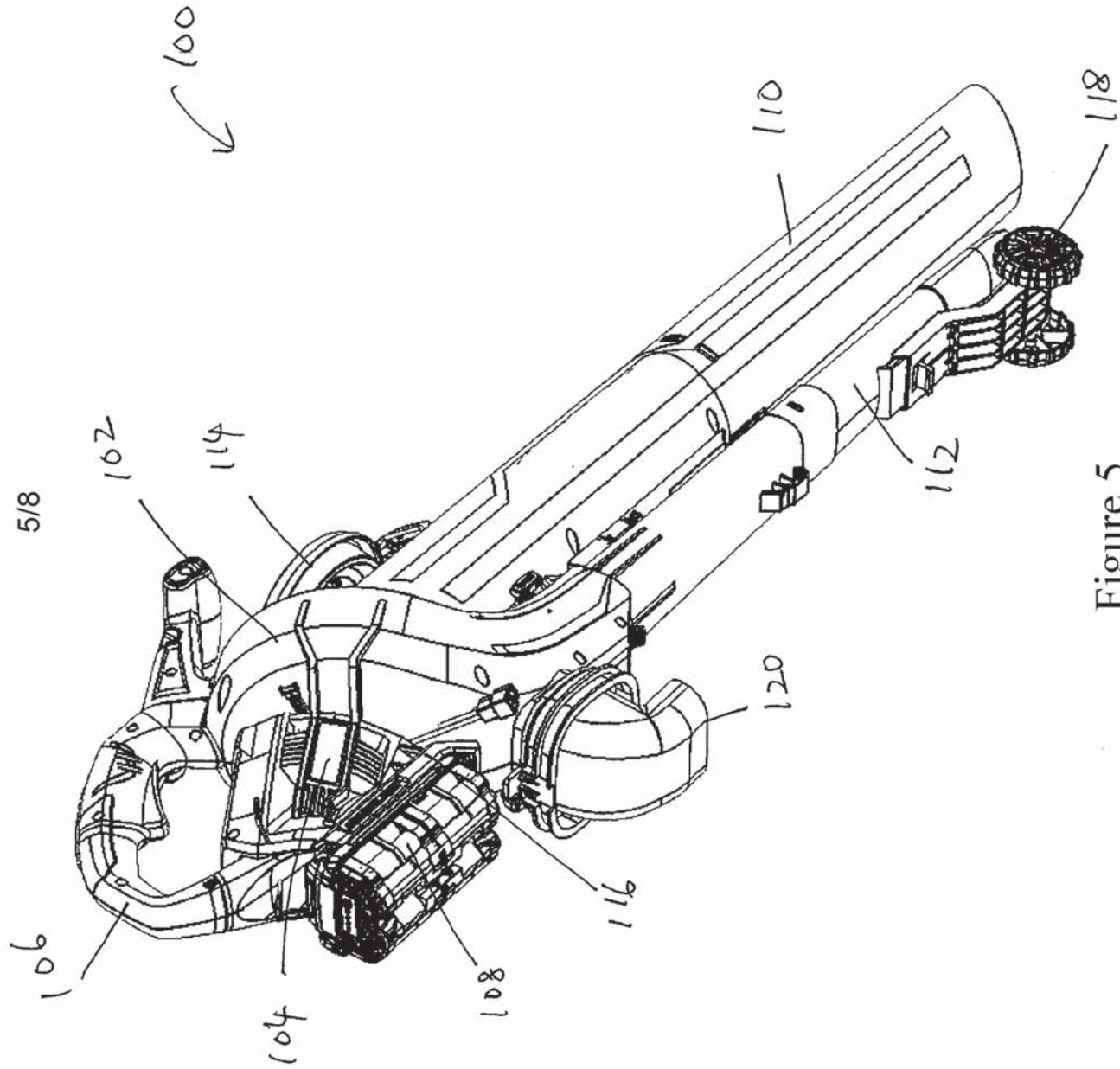


Figure 5

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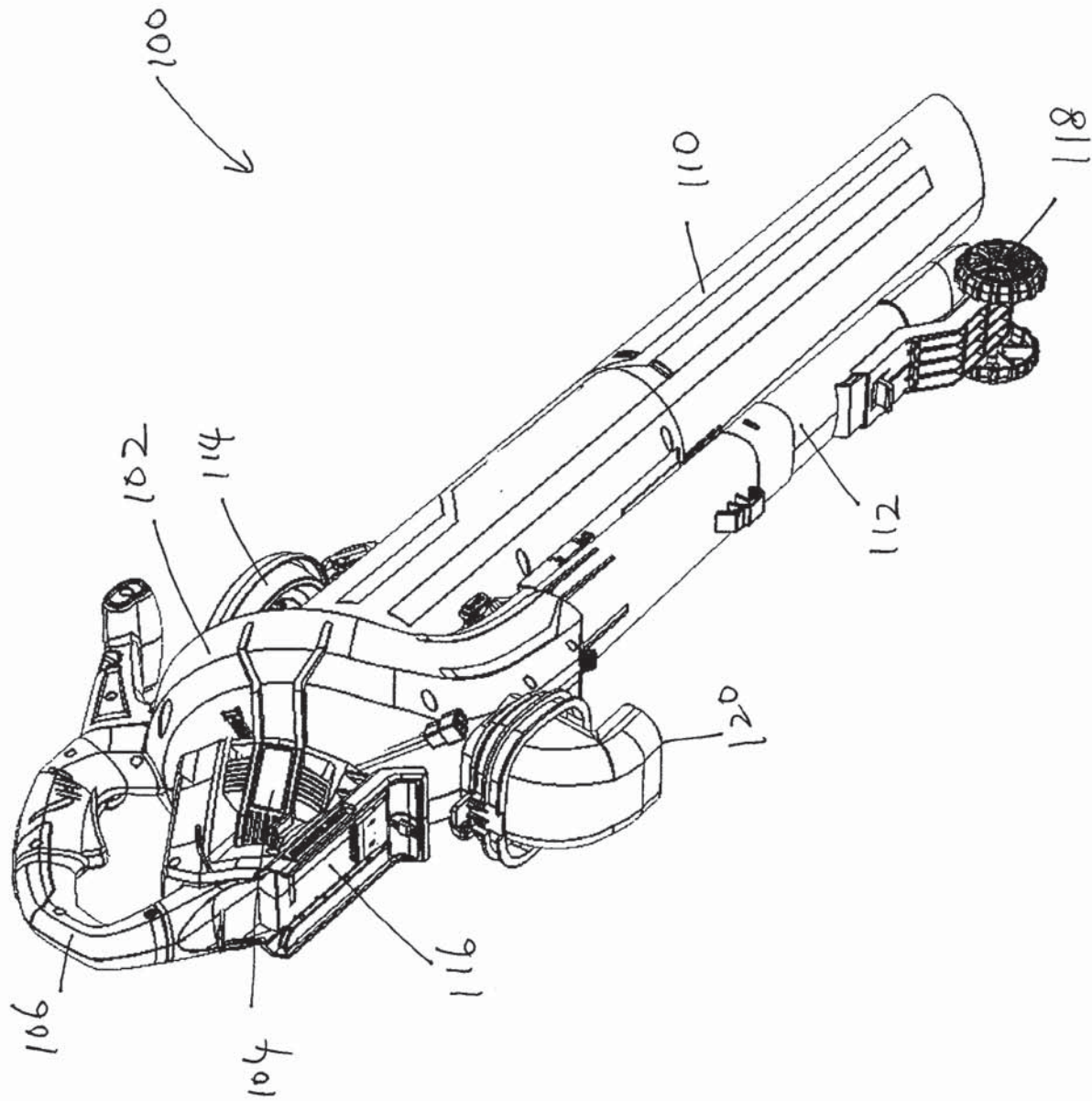


Figure 6

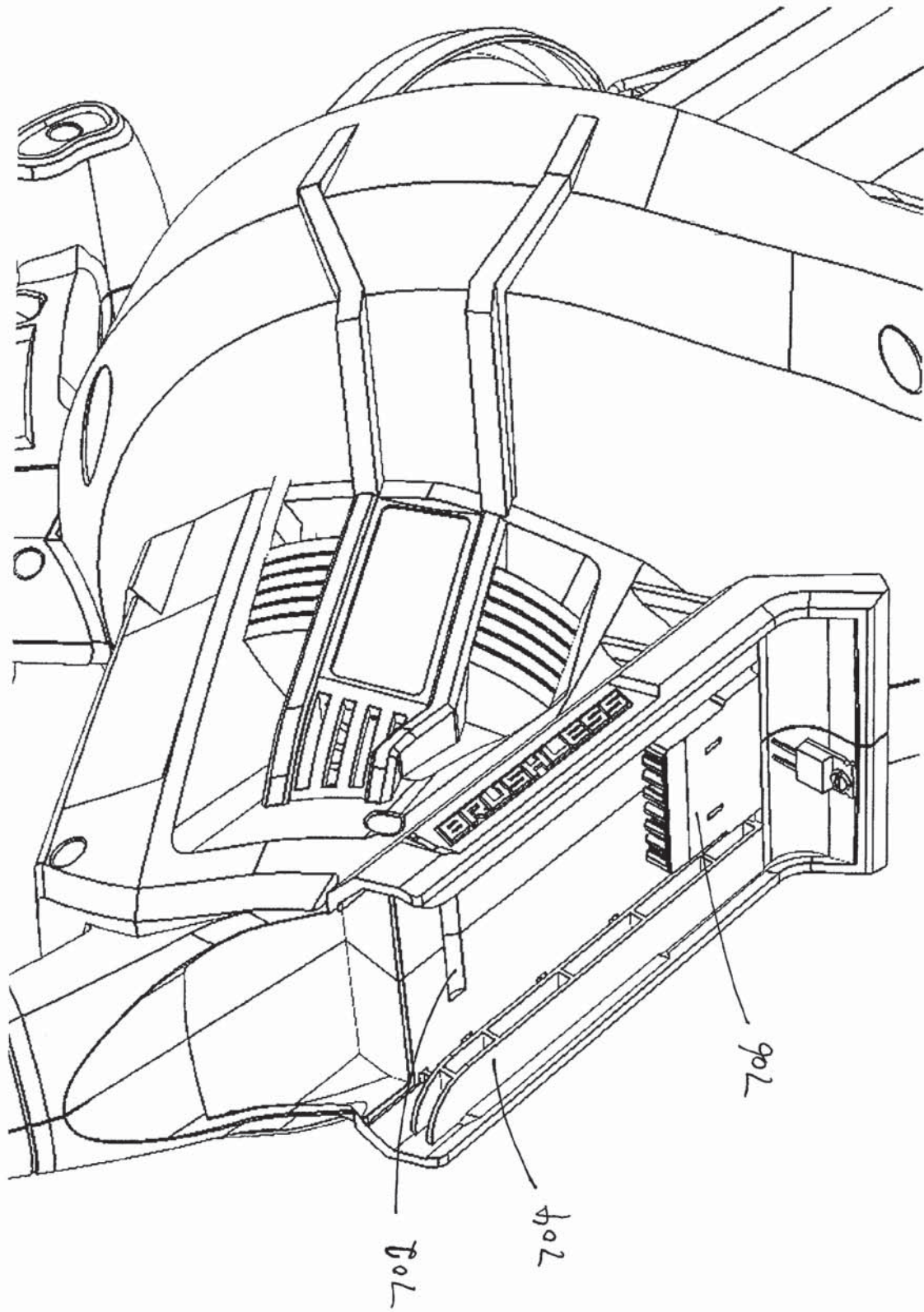


Figure 7

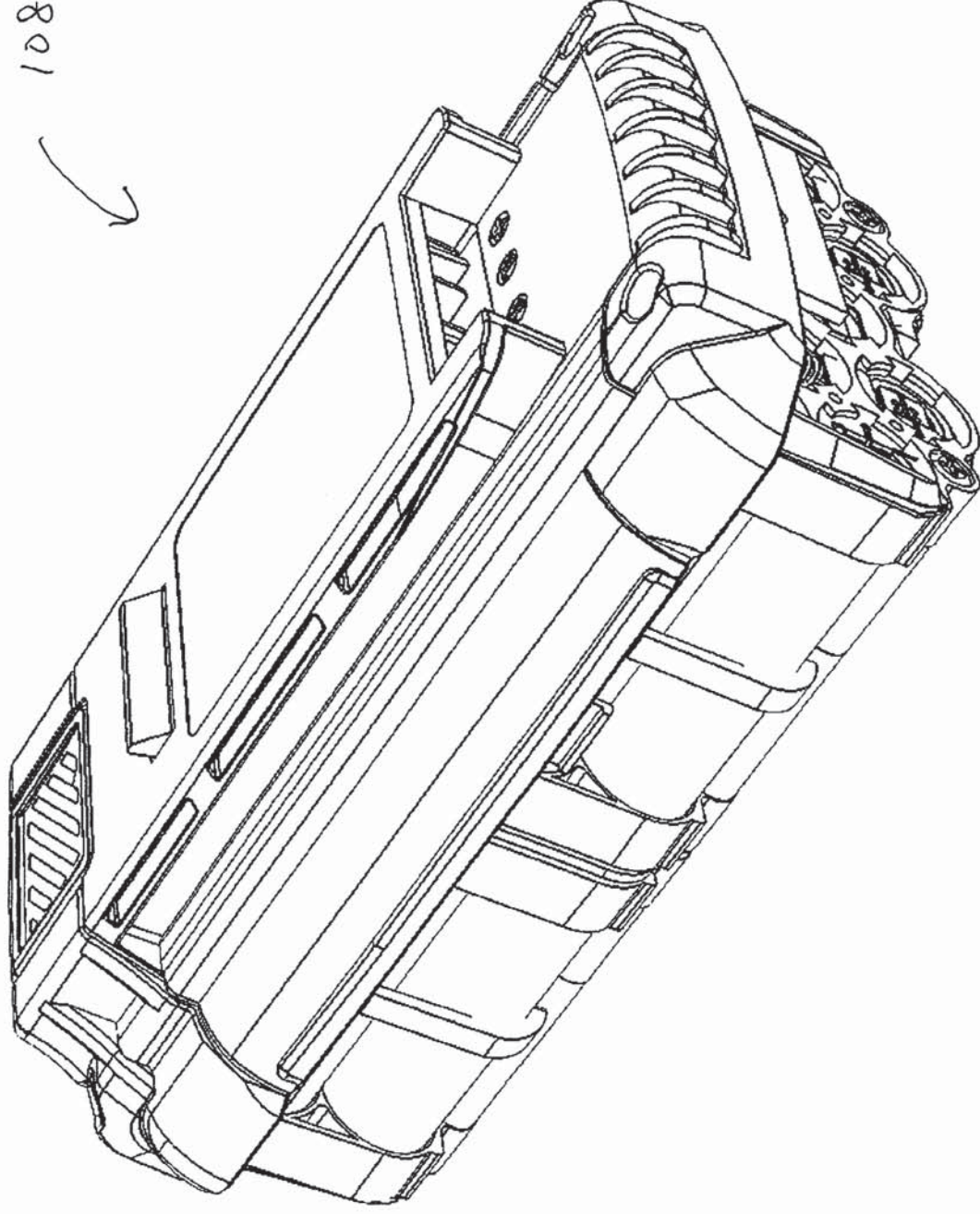


Figure 8