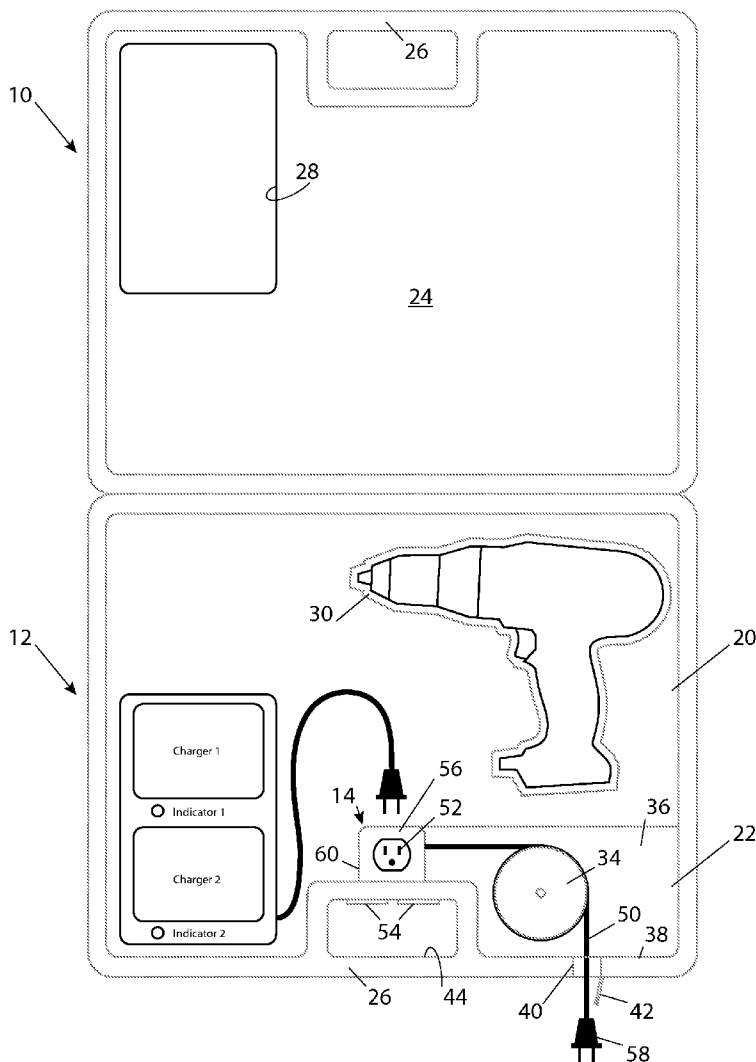


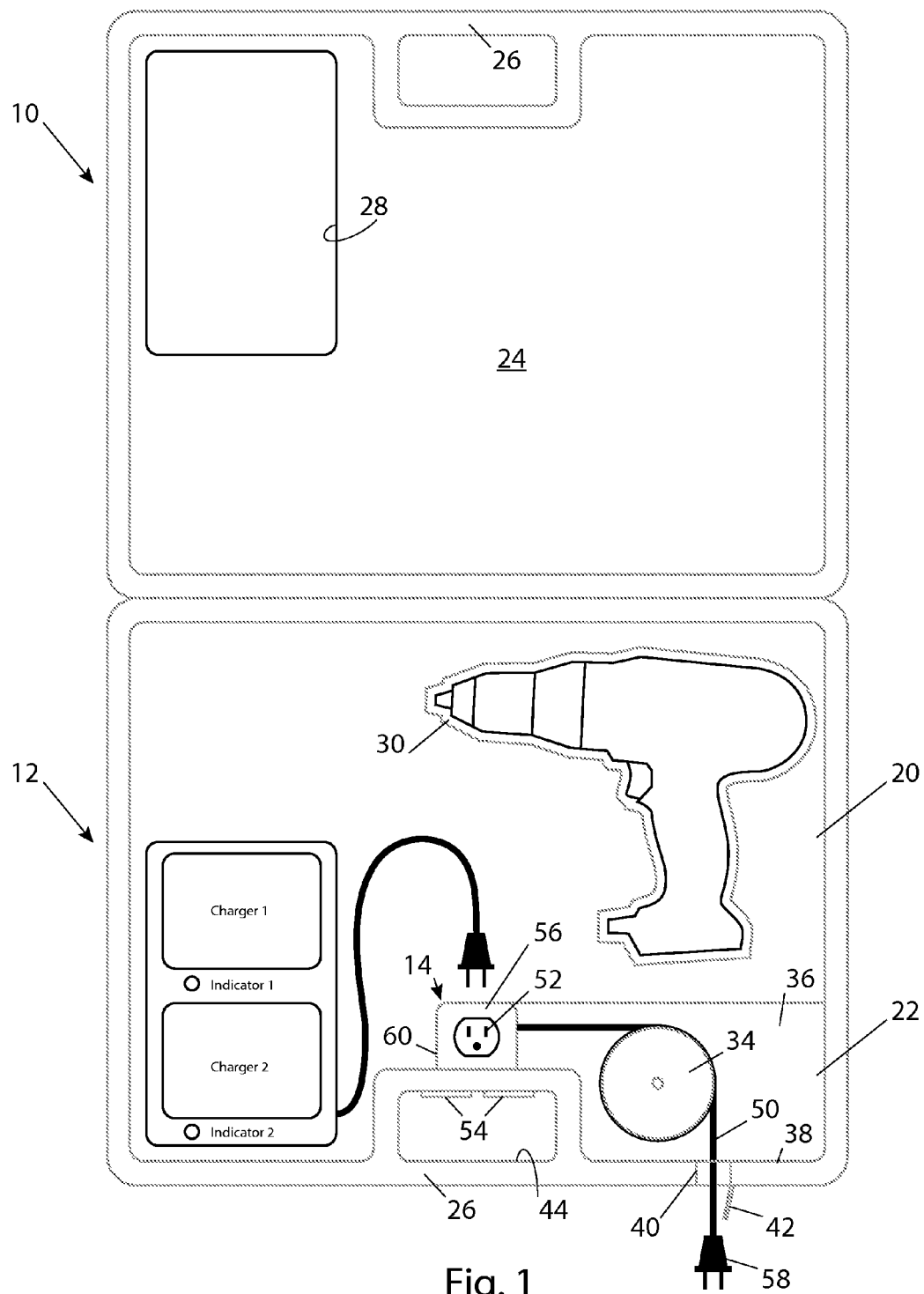


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Collister et al.(10) **Pub. No.: US 2008/0035507 A1**(43) **Pub. Date: Feb. 14, 2008**(54) **POWER TOOL CASE****Publication Classification**(76) Inventors: **Kenneth F. Collister**, North
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TROY, MI 48099-4390(57) **ABSTRACT**

A power tool case for storing battery-operated power tools includes a housing, an electrical connector, and an internal electrical outlet. The housing defines at least one compartment for storing a battery charger and has a handle for transporting the case. The electrical connector is carried by the housing and is adapted to electrically couple with an electrical power source to provide power for the case. The internal electrical outlet is also carried by the housing and is electrically coupled with the electrical connector to allow the battery charger to remain plugged into the internal electrical outlet while the battery charger is stored in the compartment.

(21) Appl. No.: **11/838,303**(22) Filed: **Aug. 14, 2007****Related U.S. Application Data**(60) Provisional application No. 60/822,262, filed on Aug.
14, 2006.



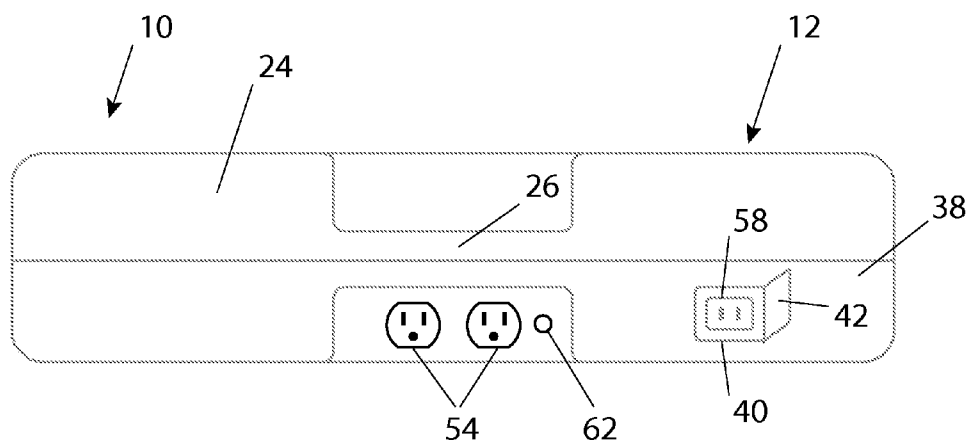


Fig. 2

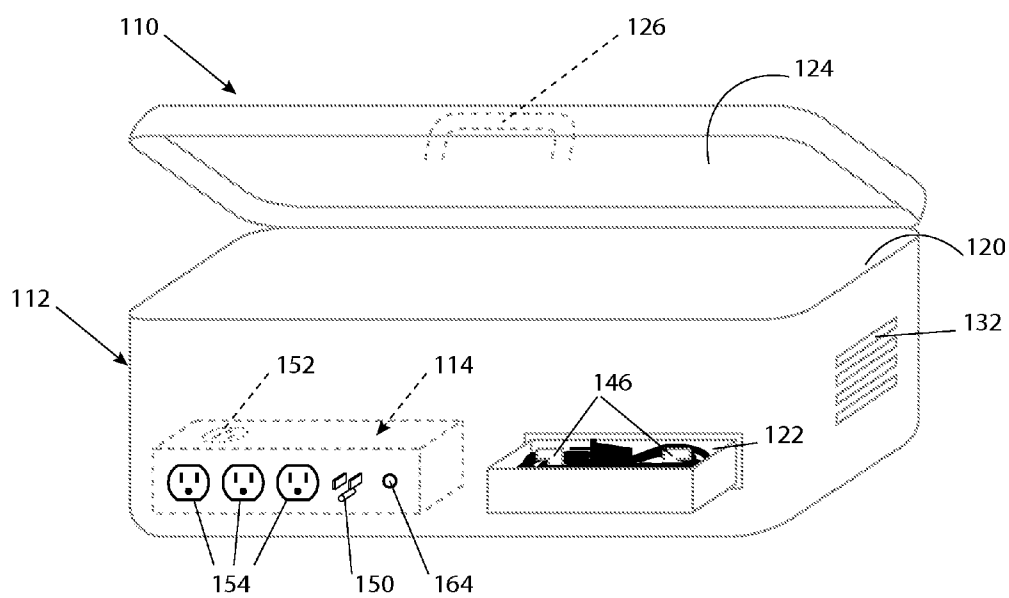


Fig. 3

POWER TOOL CASE

RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application 60/822,262, filed Aug. 14, 2006, the teachings of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] This invention relates to cases for storing power tools, and more particularly to cases for storing battery-operated power tools.

BACKGROUND OF THE INVENTION

[0003] Battery-operated power tools often are sold in kits containing a power tool, a rechargeable battery, a battery charger, and a storage case. The battery charger typically plugs into standard electrical outlets to provide alternating current (AC) to the battery charger. The battery charger converts the AC current into direct current (DC) to charge the batteries. Although most batteries today will power a tool for several hours, often the batteries will require recharging on a work site during long periods of use. Having a standardized plug on the battery charger allows it to be plugged into any standard electrical outlet on the work site. [0004] At the end of each day, the power tool, the battery, and the battery charger are typically placed back into the case to transport them from the work site. It is common for power tool users to need to charge their tools overnight so that the batteries can power the tools during their next use. In order to charge the battery once it has been stored in the case, a typical case must be opened to remove the battery charger and plug it into an electrical outlet. The battery charger must then be placed back into the case after the charge is complete to store the kit or transport it to the next work site.

SUMMARY OF THE INVENTION

[0005] According to one aspect of the invention, there is provided a power tool case for storing battery-operated power tools. The power tool case includes a housing, an electrical connector, and an internal electrical outlet. The housing defines at least one compartment for storing a battery charger and has a handle for transporting the case. The electrical connector is carried by the housing and is adapted to electrically couple with an electrical power source to provide power for the case. The internal electrical outlet is also carried by the housing and is electrically coupled with the electrical connector.

[0006] According to another aspect of the invention, the power tool case for storing battery-operated power tools includes a housing, an electrical connector, and an internal electrical outlet. The housing defines a first compartment for storing a battery charger and a second compartment for storing an electrical power cord. The housing also carries the electrical connector and the internal electrical outlet. The electrical connector is adapted to be electrically coupled with an electrical power source.

[0007] According to yet another aspect of the invention, the power tool case for storing battery-operated power tools includes a housing, an electrical connector, an internal electrical connector and a visual device. The housing defines a compartment for storing the battery charger and carries the electrical connector, the internal electrical outlet, and the

visual device. The electrical connector is adapted to be electrically coupled with an electrical power source to provide power for the case. The internal electrical outlet electrically couples with the electrical connector. The visual device enables viewing a characteristic state of the battery charger

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Preferred exemplary embodiments of the invention will hereinafter be described in conjunction with the appended drawings, wherein like designations denote like elements, and wherein:

[0009] FIG. 1 is a top view depicting an example of a power tool case for storing a power tool in an open position;

[0010] FIG. 2 is a side view of the power tool case of FIG. 1 in a closed position; and

[0011] FIG. 3 is an elevation view of another example of a power tool case for storing a power tool.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] The drawings show a power tool case generally shown at **10** for storing battery-operated power tools. The case **10** is adapted for storing and transporting power tools and their accessories, such as rechargeable batteries and battery chargers. The simplest embodiments of the power tool case **10** include a housing generally indicated at **12** and electrical circuitry generally indicated at **14**. The housing **12** includes at least one compartment for storing the power tool and for storing a battery charger. The housing **12** can be constructed from plastic, metal, wood, canvas, vinyl, or any other suitable material and may be sized to allow it to be easily carried by hand. The electrical circuitry **14** provides power for the case **10** to power the battery charger.

[0013] FIG. 1 shows one embodiment of the power tool case **10**. The housing **12** includes a first compartment **20** for storing the battery charger, a second compartment **22** for storing a power cord, a lid **24**, a handle **26**, and a visual device **28**. The housing **12** defines the first compartment **20** for storing the power tool, the battery charger, and the battery. The first compartment **20** may contain recesses **30** shaped to hold the power tool and the battery charger in place inside the compartment. The first compartment **20** is sized to provide sufficient space for the battery charger to fit inside the first compartment **20** with the battery connected to the battery charger. The compartment may be sized to accommodate one or more of each of the following: power tools, battery chargers, batteries, and other tool accessories.

[0014] The second compartment **22** stores a retractable power cord and includes a retracting device **34**. The retracting device **34** is mounted on a wall **36** of the housing **12** to wind and store a power cord within the second compartment **22**. The retracting device **34** is activated by tension to automatically retract the power cord when it is pulled. Alternatively, the retracting device **34** may retract manually and include a crank to wind and unwind the power cord from the retracting device **34**. The second compartment **22** contains a sidewall **38** that defines an opening **40**. The opening **40** provides access to the second compartment **22** from outside the case **10**. An access door **42** is pivotally attached to the sidewall **38** to cover the opening **40** in one position and pivot away from the opening **40** to allow access to the second compartment **22**. As an alternative, the access door

42 may slide within a pair of tracks in the sidewall 38 to cover the opening 40 in one position and slide away from the opening 40 to allow access to the second compartment 22 in another position.

[0015] The lid 24 is hinged to the first compartment 20 to cover the first compartment 20 when the lid is closed. The lid 24 and the first compartment 20 form the handle 26 when the case 10 is closed. The handle 26 allows the case 10 to be carried by hand. A translucent portion of the lid 24 acts as the visual device 28. The translucent portion 28 permits light to pass through the lid 24 and may diffuse some light or may be completely transparent. The translucent portion 28 may be composed of a clear or partially clear plastic, glass, or any other suitable material, or may simply be an opening 40 in the lid 24. The translucent portion 28 is located adjacent the battery charger when the case 10 is closed and provides visibility to the battery charger from outside the case. The translucent portion 28 may allow visibility into the case 10 to see if the battery charger is being powered and if a battery is connected to the battery charger. Typically, battery chargers include a charge indicator light to indicate a characteristic state of the battery charger, such as the charging state of a battery. Thus, the visual device 28 provides visibility to the charge indicator light when the case 10 is closed and provides an indication of a characteristic state of the battery charger.

[0016] The electrical circuitry 14 includes an electrical connector 50, an internal electrical outlet 52, external electrical outlets 54, and a circuit protection device 56. The electrical connector 50 is carried by the case 10 and is adapted to electrically couple with an AC electrical power source to provide power for the case 10. In the embodiment shown in FIG. 1, the electrical connector 50 is an electrical power cord having a plug 58 disposed on a distal end of the cord. The plug 58 is configured to plug into a standard AC electrical outlet. Other embodiments are also possible where the power source is DC including, for example, a solar power source such as a solar panel associated with the case itself. The power cord is electrically coupled with the internal electrical outlet 52 and is stored inside the second compartment 22.

[0017] The internal electrical outlet 52 is carried by the case 10 and is accessible to the first compartment 20. The internal electrical outlet 52 is adapted to receive a standard electrical plug and is electrically coupled with the electrical connector 50. Specifically, the internal electrical outlet 52 is able to receive a plug on the battery charger while the battery charger is stored in the first compartment 20. The case 10 may include any suitable number of internal electrical outlets 52 to power multiple battery chargers or other devices within the case.

[0018] The external electrical outlets 54 are carried by the case 10 and are electrically coupled with the electrical connector 50. The external electrical outlets 54 are able to power external devices when the electrical connector 50 is coupled with the electrical power source. As shown in FIG. 2, the external electrical outlets 54 are externally accessible from the housing 12 including when the lid 24 is closed. The external electrical outlets 54 provide additional electrical outlets to a work site. The actual number of external electrical outlets 54 provided with the case 10 may vary.

[0019] The circuit protection device 56 is electrically coupled to the electrical connector 50 to protect the electrical circuitry 14 from dangerous electrical conditions. Specifically,

the circuit protection device 56 limits the amount of electrical power passing through the electrical circuitry 14. The circuit protection device 56 includes a circuit breaker 60 to limit the amount of current that can flow through the electrical circuitry 14. The circuit breaker 60 includes a switch 62 to reset the breaker in the event that the breaker is tripped to cut off the flow of excessive electrical current. Alternatively, the circuit protection device 56 may include a fuse to provide electrical current limiting. The circuit protection device 56 may also provide electrical conditioning such as power surge protection or suppression from transient voltages. For example, the circuit protection device 56 may include metal oxide varistors or gas discharge arrestors to prevent transient voltages from reaching the internal electrical outlet 52 or external electrical outlet 54.

[0020] The power tool case 10 allows the battery to charge inside the case while the case is closed by using a battery charger with a standard electrical AC plug. When packing the case 10 after using the power tool, the user may dispose the battery charger in the first compartment 20, plug the battery charger into the internal electrical outlet 52, engage the battery to the battery charger, and close the lid 24. The order of the steps is not critical. For example, the user may engage the battery with the battery charger before or after the battery charger is disposed inside the case 10 and/or the battery charger is plugged into the internal electrical outlet 52. Once the case 10 is closed, the case 10 may be transported to a location, such as the user's home, for storage. To charge the battery stored inside the case 10, the user simply pulls the distal end of the electrical power cord out of the second compartment 22 and inserts the plug 58 into a power source. The translucent portion 28 allows the user to see the charge indicator light on the battery charger which tells the user that the battery is charging inside the case 10. When the battery is done charging (typically indicated by the light on the battery charger turning off), the user simply unplugs the power cord from the power source and allows the power cord to retract into the second compartment 22. Thus the user is able to recharge the battery without having to open the case 10, pull out the battery and the battery charger, and then repack the case when the battery is finished charging.

[0021] FIG. 3 shows another embodiment of the power tool case generally shown at 110. The case 110 includes a housing generally indicated at 112 and electrical circuitry 114. The housing 112 includes a first compartment 120 for storing the battery charger, a lid 124, a handle 126, a vent 132, and a second compartment 122 for storing a power cord. The first compartment 120 stores the power tool, the battery charger, and at least one battery. In this embodiment, the second compartment 122 is a drawer that slides out from the housing 112 to provide access to the second compartment 122. The second compartment 122 includes a pair of projections 146 extending from a sidewall of the compartment to wind the power cord around for storage.

[0022] The lid 124 is pivotally connected to the housing 112 and is operable to cover the first compartment 120 and opens to provide access to the power tool inside the compartment. The handle 126 is u-shaped and is pivotally connected to the lid 124 to assist in carrying the case 110 by hand. The vent 132 is located on a sidewall of the housing 112 and includes a series of perforations to provide ventilation to the case 110 and prevent the battery and battery charger from overheating inside the case 110 when in use. The housing 112 may further include a fan associated with

the vent for actively cooling the inside of the housing. The fan could be controlled with a switch or a thermostat. In addition to the fan or instead of it, the case 110 could include a shut off circuit that would turn off the power to the circuitry 114 in the event that a predetermined temperature limit is reached. This would also prevent overheating.

[0023] The electrical circuitry 114 includes an internal electrical outlet 152, an electrical connector 150, external electrical outlets 154, and a visual device 164. The electrical connector 150 is electrically coupled with the internal electrical outlet 152. The electrical connector 150 is a male electrical plug recessed in an outer wall of the housing 112 to provide connectivity to an external power source. The electrical connector 150 shown in FIG. 3 is adapted to mate with a female connector on the power cord to couple the electrical connector 150 with the external power source through the power cord. Alternatively, the electrical connector 150 may comprise other electrical connector types capable of connecting with power cords and may be located elsewhere on the housing 112, such as within the second compartment 122, to provide power to the case 110.

[0024] In this embodiment, the visual device 164 is a light carried by the case 110 for indicating a characteristic state of the battery charger. Specifically, the light 164 is a light emitting diode (LED) electrically coupled with the internal electrical outlet 152, although any other light emitting device may be used such as a standard light bulb. The LED 164 is located on the housing 112 so that it is externally visible. The LED 164 monitors the current level flowing through the internal electrical outlet 152. The LED 164 glows brightly when the current level is at or above a predetermined threshold, indicating that the battery charger is charging a battery. The LED 164 turns dim when the current level is below the threshold, indicating that the battery charger is not charging a battery.

[0025] To charge a battery while it is stored inside the case 110, the battery charger is placed inside the first compartment 120, plugged into the internal electrical outlet 152, and the battery is connected to the charger. The user opens the second compartment 122, removes the power cord, plugs the female connector on the power cord into the electrical connector 150, and plugs the male plug on the power cord into a power source. The LED 164 glows to indicate that the battery is charging. The battery charger may stop charging after a predetermined period of time or when the battery charge has reached a desired level. Generally, battery chargers reduce their current draw when they stop charging a battery. When the charger is done charging a battery, the current draw falls below a threshold causing the LED 164 to dim, thus indicating that the battery is done charging.

[0026] Alternatively, the LED 164 may be adapted to indicate other characteristics of the battery charger. For example, the LED 164 may glow to indicate when the battery charger is drawing any current through the internal electrical outlet 152. Moreover, the LED 164 may indicate when the battery charger is plugged into the internal electrical outlet 152 by sensing that the device plugged into the internal electrical outlet 152 forms a completed circuit with the internal electrical outlet 152. In another embodiment, multiple LEDs may be provided to indicate multiple characteristics of a single battery charger. Moreover, multiple LEDs may be provided, each associated with a separate internal electrical outlet 152.

[0027] It is to be understood that the foregoing description is not a description of the invention itself, but of one or more preferred exemplary embodiments. The invention is not limited to the particular embodiment(s) disclosed herein, but rather is defined solely by the claims below. Furthermore, the statements contained in the foregoing description relate to particular embodiments and are not to be construed as limitations on the scope of the invention or on the definition of terms used in the claims, except where a term or phrase is expressly defined above. Various other embodiments and various changes and modifications to the disclosed embodiment(s) will become apparent to those skilled in the art. All such other embodiments, changes, and modifications are intended to come within the scope of the appended claims.

[0028] For example, the case 10 need not contain a separate compartment for storing a power cord. A power cord may be stored in the first compartment 20 having an access door to remove the power cord from the case 10 without having to open the lid 24. Likewise, the case 10 may contain a pair of projections extending from an outer sidewall of the housing 12 to store the power cord by winding it around the projections. In another alternative, the case 10 may be in the form of a canvas or vinyl bag. The case 10 or bag may have a zipper or snaps to keep it closed, rather than a lid. In addition, the handle 26 may be any number of suitable types, such as a shoulder strap attached to the case 10.

[0029] As used in this specification and claims, the terms “for example” and “such as,” and the verbs “comprising,” “having,” “including,” and their other verb forms, when used in conjunction with a listing of one or more components or other items, are each to be construed as open-ended, meaning that that the listing is not to be considered as excluding other, additional components or items. Other terms are to be construed using their broadest reasonable meaning unless they are used in a context that requires a different interpretation.

1. A power tool case for storing battery-operated power tools comprising:

- a housing defining at least one compartment for storing a battery charger;
- a handle carried by the housing to allow a user to transport the case;
- an electrical connector carried by the housing adapted to electrically couple with an electrical power source to provide power for the case; and
- an internal electrical outlet carried within the compartment and electrically coupled with the electrical connector;

wherein the location of the internal electrical outlet allows the battery charger to remain plugged into the internal electrical outlet while the battery charger is stored in the compartment.

2. The case of claim 1 further comprising an external electrical outlet carried by the housing and electrically coupled with the electrical connector and wherein the external electrical outlet is available to power an external device when the electrical connector is coupled with the electrical power source.

3. The case for storing tools of claim 1 further comprising a visual device for indicating a characteristic state of the battery charger.

4. The case for storing tools of claim 1 wherein the electrical connector is a plug mounted on the housing.

5. The case for storing tools of claim 1 wherein the connector is an electrical power cord having a plug disposed on a distal end.

6. The case for storing tools of claim 5 further including a compartment for storing the electrical power cord.

7. The case for storing tools of claim 1 further including a vent for preventing heat from building up within the case.

8. The case for storing tools of claim 1 further including a circuit protection device electrically coupled with the electrical connector.

9. The case for storing tools of claim 8 wherein the circuit protection device includes a switch for resetting the circuit protection device.

10. A power tool case for storing battery-operated power tools comprising:

a housing defining a first compartment for storing a battery charger;

the housing defining a second compartment for storing an electrical power cord;

an electrical connector carried by the housing and adapted to be electrically coupled with an electrical power source;

an internal electrical outlet electrically coupled with the electrical connector; and

wherein the case is enabled to power a battery charger stored inside the case when the battery charger is plugged into the internal electrical outlet and the electrical connector is coupled with an electrical power source.

11. The case of claim 10 further comprising an external electrical outlet carried by the housing and electrically coupled with the electrical connector to provide power to outside the case;

wherein the external electrical outlet is available to power an external device when the electrical connector is coupled with the electrical power source.

12. The case for storing tools of claim 10 further comprising a light for indicating a characteristic state of the battery charger.

13. The case for storing tools of claim 10 further comprising a translucent portion carried by the housing for providing visibility inside the case to view a charge indicator located on the battery charger.

14. The case for storing tools of claim 11 wherein the connector is a plug mounted on the housing.

15. The case for storing tools of claim 11 wherein the connector is a plug mounted on an end of an electrical power cord electrically coupled with the internal electrical outlet.

16. The case for storing tools of claim 10 wherein the compartment for storing the electrical power cord further includes projections to wrap the electrical power cord around.

17. The case for storing tools of claim 10 wherein the compartment for storing the electrical power cord further includes a retracting device to retract the power cord into the compartment.

18. The case for storing tools of claim 10 further including a vent for preventing heat from building up within the case.

19. The case for storing tools of claim 10 further including a circuit protection device electrically coupled with the electrical connector.

20. A method of charging a power tool battery comprising the steps of:

(a) disposing a battery charger having an electrical plug inside a case;

(b) engaging the power tool battery with the battery charger;

(c) plugging the electrical plug into an AC electrical outlet carried within the case and coupled with electrical circuitry inside the case;

(d) closing the case; and

(e) electrically coupling the electrical circuitry with an AC electrical power source, wherein the AC electrical power flows through the electrical outlet and powers the battery charger inside the case to charge the power tool battery without needing to open the case and remove the power tool battery and battery charger.

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