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Mains power adapter for cordless power tools

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Abstract

An AC adapter unit for substituting a power tool battery pack comprising a base from which a stem comprising power tool DC power contacts extends substantially perpendicularly from an upper surface thereof and wherein the base comprises a recess having an electrical connection plug therein, the plug comprising exposed pins concealed within the recess, the recess shaped to fit a socket body of an extension lead therein such that the pins connect with respective slots of a socket thereof and wherein the unit comprises an AC to DC conversion circuitry between the pins and the power tool DC contacts.

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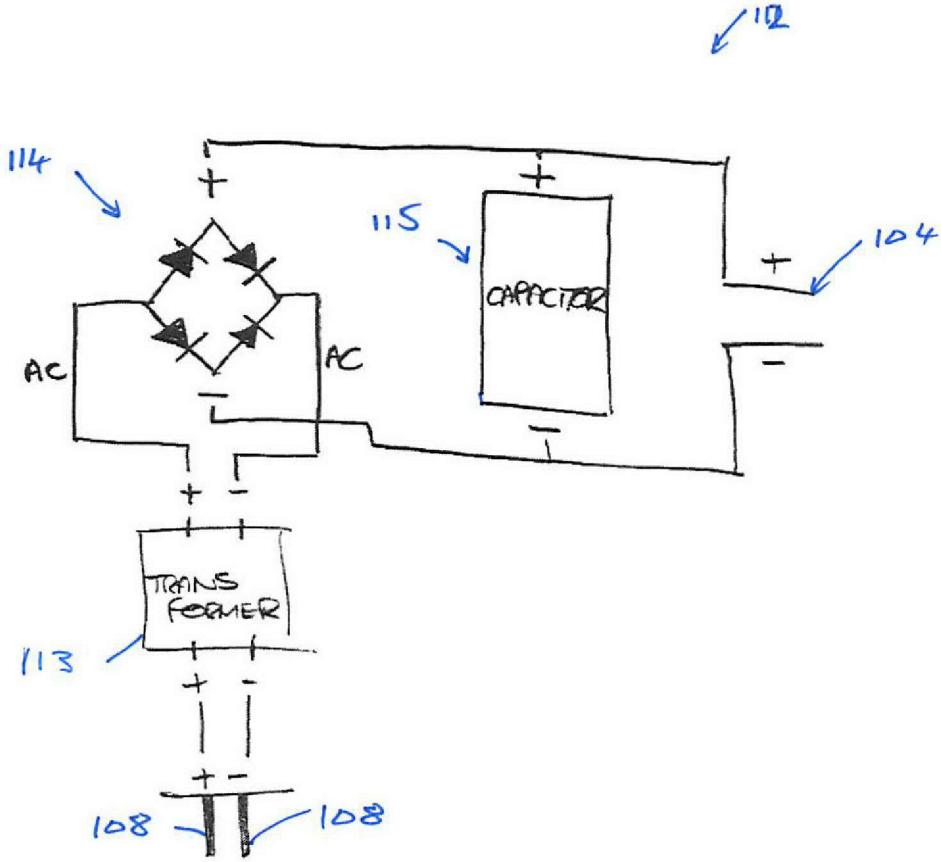

Figure 3

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Regulation 3.2

AUSTRALIA

Patents Act 1990

Provisional Specification

An Ac/Dc adapter unit for substituting power tool battery packs

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Field of the Invention

[0001] This invention relates generally to an Ac/Dc adapter unit for substituting conventional power tool battery packs.

Background of the Invention

[0002] Cordless power tools comprise replaceable battery packs for cord free operation. Conventional battery packs typically connect to power tools via the handle thereof wherein the battery pack comprises a base exposing a stem having DC electrical contacts which is inserted into the handle to power the power tool.

[0003] When depleted, the battery pack may be replaced with a fresh battery pack although a fresh battery pack may not always be on hand, thereby resulting in work stoppage.

[0004] As such, the present invention seeks to provide a way, to overcome or substantially ameliorate at least some of the deficiencies of the prior art, or to at least provide an alternative.

[0005] It is to be understood that, if any prior art information is referred to herein, such reference does not constitute an admission that the information forms part of the common general knowledge in the art, in Australia or any other country.

Summary of the Disclosure

[0006] There is provided herein an AC adapter unit for substituting a power tool battery pack. The unit comprises a body defining a base from which the stem comprising power tool DC power contacts extend substantially perpendicularly from an upper surface thereof.

[0007] The base comprises a recess having an electrical connection plug therein. The plug comprises exposed pins concealed within the recess.

[0008] The recess is shaped to fit a socket body of an extension lead therein such that the pins connect with respective slots of a socket of the socket body.

[0009] Furthermore, the unit comprises a AC to DC conversion circuitry between the pins and the power tool DC contacts for supplying the requisite DC power to the power tool, such as 12 or 36 V DC.

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[0010] As such, the present unit may be electrically connected between a power tool and mains supply to continuously supply DC power to the power tool without the requirement to replace depleted battery packs.

[0011] The unit may be shaped substantially according to the shape of a battery pack such that unit may be connected substantially as is to a power tool. Furthermore, the AC to DC conversion circuitry may match the DC supply voltage and requisite current for the power tool such as by supplying 12 or 36 V DC.

[0012] The unit may be substantially ruggedised to be suited for a working environment and may comprise shock absorbing padding therein (such as a foam) to protect the AC to DC conversion circuitry, may comprise a rubberised exterior and may be sealed to be substantially dust and a waterproof.

[0013] In embodiments, the recess may fit adapters having plugs for different countries.

[0014] In embodiments, the recess comprises a latch which selectively protrudes into the recess to hold the socket body to prevent the socket body from being pulled from the recess in use. In embodiments, the unit comprises an internal battery such that the unit may alternatively be used for cordless or corded operation.

[0015] Other aspects of the invention are also disclosed.

Brief Description of the Drawings

[0016] Notwithstanding any other forms which may fall within the scope of the present invention, preferred embodiments of the disclosure will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows an underside plan view of an AC adapter unit for substituting a power tool battery pack in accordance with an embodiment;

Figure 2 shows a side elevation view of the unit and an electrical extension lead; and

Figure 3 shows AC to DC conversion circuitry in accordance an embodiment.

Description of Embodiments

[0017] An AC adapter unit 100 for substituting a power tool battery pack comprises a body 101 defining a base 102 from which a stem 103 comprising power tool DC power contacts extends substantially perpendicularly from an upper surface 105 thereof.

[0018] The base 102 comprises a recess 106 having an electrical connection plug 107 therein.

[0019] The plug 107 comprises exposed pins 108 concealed within the recess 106.

[0020] The recess 106 may be shaped to fit a socket body 109 of an electrical extension lead 110 such that the pins 108 connect with respective slots of a socket 111 thereof. In embodiments, the recess 106 may be shaped to fit a number of different types of socket bodies 109.

[0021] The unit 100 further comprises AC to DC conversion circuitry 112 therein between the pins 108 and the power tool DC contacts 104.

[0022] The recess 106 may be substantially circular in cross-section as illustrated in Figure 1 to fit the substantially cylindrical socket body 109 of the extension lead 110. The pins 108 may be flat pins arranged according to the configuration illustrated in Figure 1 according to the Australian/New Zealand plug standard. However, in alternative embodiments, the pins 108 may be configured for other countries. In embodiments, interchangeable plug adapters (not shown) having pins 108 suited for different countries may be fitted to the base 102.

[0023] The AC to DC conversion circuitry 112 may comprise a stepdown transformer 113 connected to a bridge rectifier 114 having a smoothing capacitor 115. As is illustrated in figure 1, the transformer 113 and bridge rectifier 114 may be located within the base 102 with the smoothing capacitor 115 housed within the stem 103.

[0024] The body 101 may be shaped to replicate a battery pack of a power tool. As such, in use, the battery pack may be substituted with the unit 100. The electrical lead 110 may be connected to the plug 107 within the recess 106 thereof so as to provide DC power to the power tool via the power tool DC contacts 104 drawn from the electrical lead 110 connected to mains power.

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[0025] The body 101 may comprise shock absorption padding therein, such as foam padding to protect the electrical componentry 112 therein.

[0026] The body 101 may comprise a rubberised exterior and may be sealed to be substantially dust proof and/or waterproof.

[0027] The unit 100 may comprise an indicator indicating electrical connection to mains power. The conversion circuitry 112 may be protected with surge protection including being fused.

[0028] In embodiments, the recess 106 may comprise a latch (not shown) which protrudes into the recess 106 to engage the socket body 109, such as engaging under a peripheral rim 116 of the socket body 109.

[0029] In embodiment, the unit 100 comprises an interior battery therein which may supply the power tool when the extension lead 110 is not connected.

[0030] The foregoing description, for purposes of explanation, used specific nomenclature to provide a thorough understanding of the invention. However, it will be apparent to one skilled in the art that specific details are not required in order to practise the invention. Thus, the foregoing descriptions of specific embodiments of the invention are presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed as obviously many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the following claims and their equivalents define the scope of the invention.

[0031] The term “approximately” or similar as used herein should be construed as being within 10% of the value stated unless otherwise indicated.

Claims

1. An AC adapter unit for substituting a power tool battery pack comprising a base from which a stem comprising power tool DC power contacts extends substantially perpendicularly from an upper surface thereof and wherein the base comprises a recess having an electrical connection plug therein, the plug comprising exposed pins concealed within the recess, the recess shaped to fit a socket body of an extension lead therein such that the pins connect with respective slots of a socket thereof and wherein the unit comprises an AC to DC conversion circuitry between the pins and the power tool DC contacts.

2. The AC adapter unit as claimed in claim 1, wherein the recessed plug is circular in cross-section.

3. The AC adapter unit as claimed in claim 2, wherein the plug that has three flat pins in a triangular pattern.

4. The AC adapter unit as claimed in claim 1, wherein the conversion circuitry comprises surge protection.

5. The AC adapter unit as claimed in claim 1, wherein the conversion circuitry is fused.

6. The AC adapter unit as claimed in claim 1, wherein the unit comprises shock absorption padding therein.

7. The AC adapter unit as claimed in claim 6, wherein the shock absorbing padding comprises foam.

8. The AC adapter unit as claimed in claim 1, wherein the unit comprises a rubberised exterior.

9. The AC adapter unit as claimed in claim 1, wherein the unit is sealed to be substantially dust proof.

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10. The AC adapter unit as claimed in claim 1, wherein the unit is sealed to be substantially waterproof

11. The AC adapter unit as claimed in claim 1, wherein the unit comprises interchangeable plug adapters having pins suited for different countries which can be fitted to the base.

12. The AC adapter unit as claimed in claim 1, wherein AC to DC conversion circuitry comprises a stepdown transformer.

13. The AC adapter unit as claimed in claim 12, wherein the stepdown transformer is connected to a bridge rectifier.

14. The AC adapter unit as claimed in claim 13, wherein the bridge rectifier is connected to a smoothing capacitor.

15. The AC adapter unit as claimed in claim 14, wherein the transformer and bridge rectifier are located within the base.

16. The AC adapter unit as claimed in claim 15, wherein the smoothing capacitor is housed within the stem.

17. The AC adapter unit as claimed in claim 1, wherein the body is shaped according to the shape of the power tool battery pack.

18. The AC adapter unit as claimed in claim 1, wherein the unit comprises an indicator indicating electrical connection to mains power.

19. The AC adapter unit as claimed in claim 1, wherein the recess comprises a latch which protrudes into the recess to engage the socket body.

20. The AC adapter unit as claimed in claim 19, wherein the latch engages under a peripheral rim of the socket body.

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21. The AC adapter unit as claimed in claim 1, wherein the unit comprises an interior battery therein which may supply the power tool when the extension lead is not connected.

22. A method of supplying power to a power tool using the unit as claimed in claim 1, the method comprising replacing the battery pack of the power tool with the unit and electrically connecting the units to mains using an electrical lead by inserting a socket body of the electrical lead into the recess of the unit such that the plug of the unit electrically connects with a socket of the socket body.

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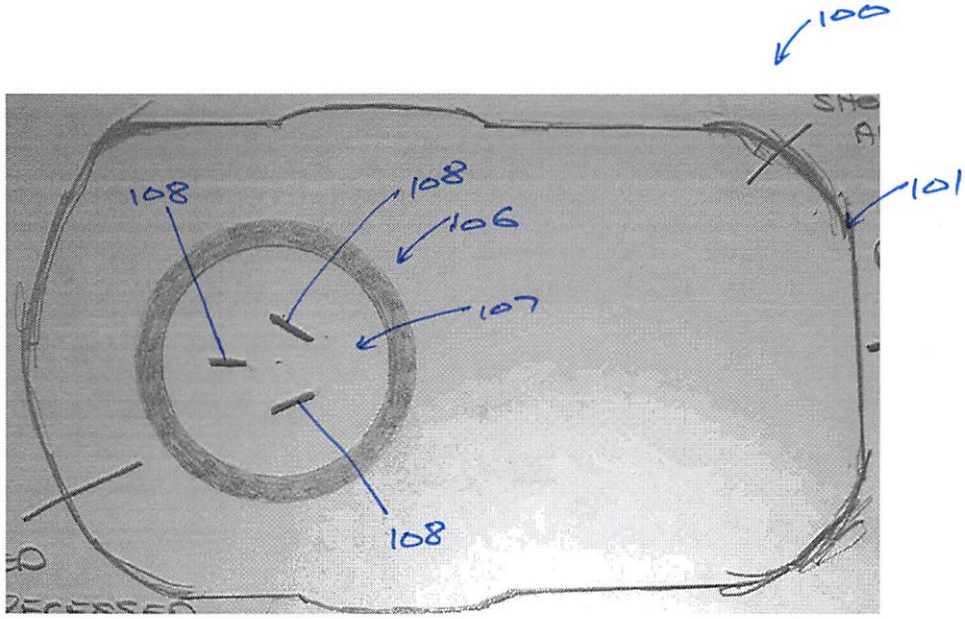

Figure 1

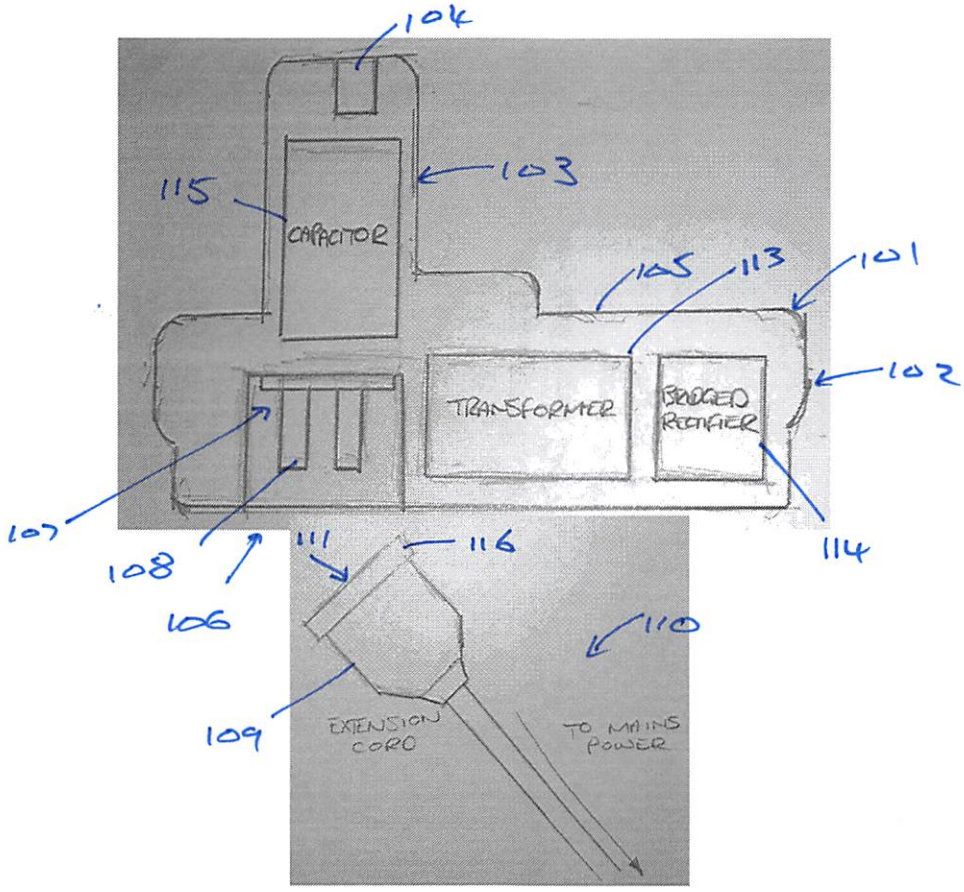

Figure 2

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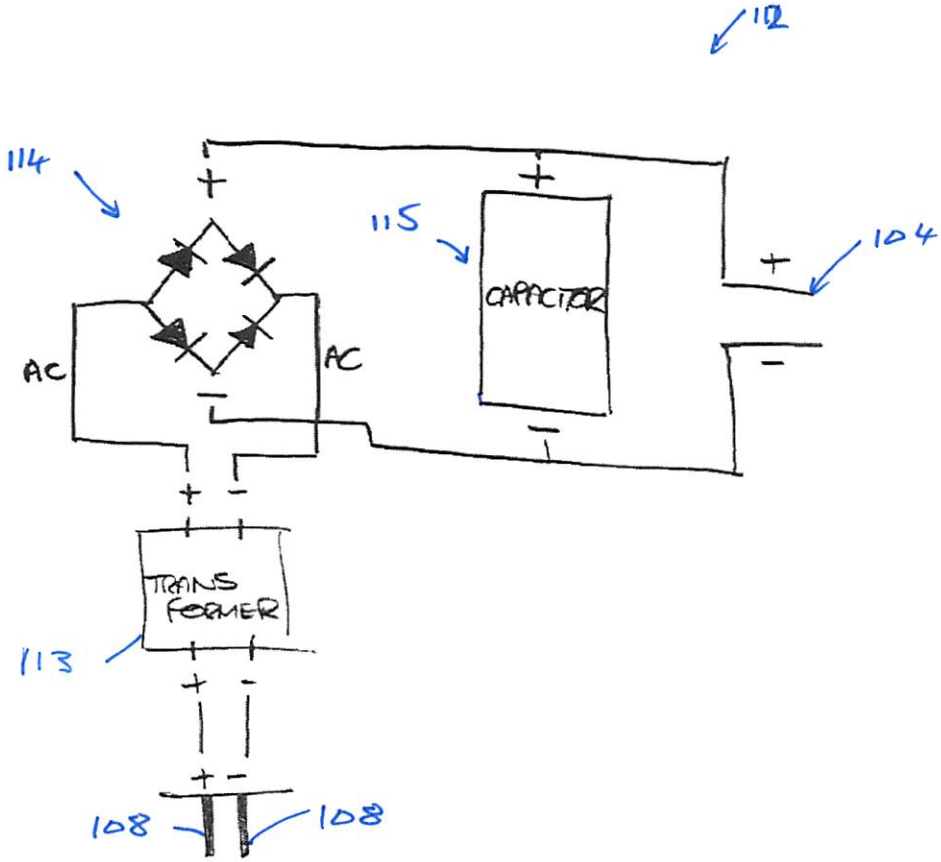

Figure 3