

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
17 March 2005 (17.03.2005)

PCT

(10) International Publication Number  
**WO 2005/024977 A1**

(51) International Patent Classification<sup>7</sup>: **H01M 2/10**

(21) International Application Number:  
PCT/AU2003/001179

(22) International Filing Date:  
10 September 2003 (10.09.2003)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

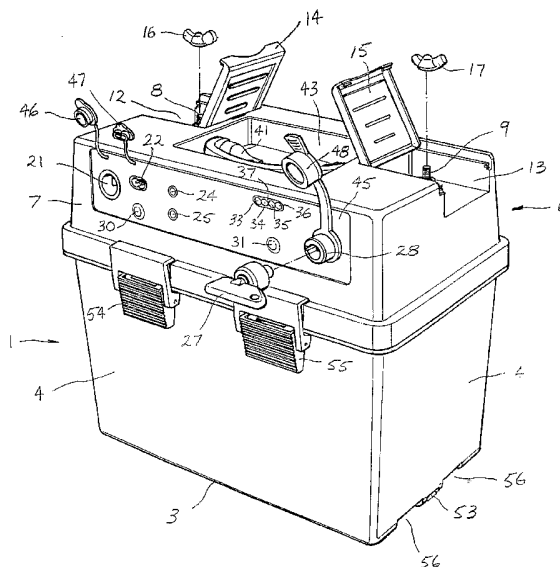
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN,*

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(54) Title: A PORTABLE WATER RESISTANT MULTI-FUNCTION LEAD-ACID BATTERY BOX



(57) Abstract: The invention provides a battery box including a body (1) for housing a lead acid battery (2), the body having a base (3) and sides (4) extending from the base to define an open top (5). A lid (6) is applicable to the body to close the top. In use, the lid has at least one generally vertically oriented side (7). Each one of a plurality of relatively water sensitive electrical components is electrically connectable to the battery and housed substantially within the lid. The electrical components each have a user interface located on the vertically oriented side (7) thereby to inhibit damage to the electrical component as a result of water ingress.



TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— of inventorship (Rule 4.17(iv)) for US only

**Published:**

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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## A PORTABLE WATER RESISTANT MULTI-FUNCTION LEAD-ACID BATTERY BOX

### FIELD OF THE INVENTION

The invention relates to a lead acid battery box. The battery box has been  
5 specifically designed for use marine applications, as well as in recreational vehicles and  
as a portable power supply for a range of outdoor activities. The invention will be  
described hereinafter with reference to such applications. However, it will be  
appreciated that the invention is not limited to this particular field of use.

### BACKGROUND OF THE INVENTION

10 The following discussion of the prior art is intended to place the invention in an  
appropriate technical context and to allow its significance properly to be appreciated.  
The discussion of prior art should in no way be considered as an admission that such  
prior art is widely known or forms part of common general knowledge in the field.

Portable lead acid battery boxes are known in the prior art. Prior art battery  
15 boxes typically include a prismatic body for containing a lead acid battery and a  
removable lid. The lid fits over a top portion of the box, thereby to provide a degree of  
water protection to the battery.

Some prior art battery boxes include electronic components connected to the  
battery. However, these components are often inadequately shielded from water,  
20 thereby creating a substantial risk of damage to the relatively sensitive electrical  
components and also increasing the risk of accidental electrocution.

Another problem with prior art battery boxes is that separate external equipment  
is required to charge the battery.

It is an object of the present invention to overcome or ameliorate one or more of  
25 the disadvantages of the prior art, or at least to provide a useful alternative.

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## SUMMARY OF THE INVENTION

Accordingly, a first aspect of the invention provides a portable water resistant lead acid battery box including;

- a body for housing a lead acid battery, said body having a base and sidewalls
- 5 extending from said base to define an open top;
- a lid applicable to said body to close said top, said lid, in use, having at least one generally vertically oriented side; and
- at least one relatively water sensitive electrical component electrically connectable to said battery and housed at least substantially within said lid, said
- 10 electrical component having a user interface located on said vertically oriented side thereby to inhibit damage to said electrical component as a result of water ingress.

Preferably, the at least one electrical component includes a battery recharger operable on the battery, the user interface for the recharger being connectable to an external power source. More preferably, the battery box includes two user interfaces for

15 the recharger, a first recharger interface being a DC port to allow the battery to be recharged from a 12V power source and a second recharger interface being an AC port to allow the battery to be recharged from mains power.

Preferably, the recharger is of the type providing a higher charging current until the battery is close to its rated capacity and then switching to a lower conditioning

20 current. More preferably, the higher charging current is around 1.0 Amps. Even more preferably, the conditioning current is around 0.1 Amps.

A second aspect of the invention provides a portable lead acid battery box including:

- a body for housing a lead acid battery, said body having a base and sidewalls
- 25 extending from said base to define an open top;

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a lid applicable to said body to close said top; and

a battery recharger for recharging the battery, said recharger being contained at least substantially within a volume defined by said body and said lid.

Preferably, the recharger is of the type providing a higher charging current until  
5 the battery is close to its rated capacity and then switching to a lower conditioning current. More preferably, the higher charging current is around 1.0 Amps. Even more preferably, the conditioning current is around 0.1 Amps.

Preferably, the battery box includes two user interfaces for the recharger, a first recharger interface being a DC port to allow the battery to be recharged from a 12V  
10 power source and a second recharger interface being an AC port to allow the battery to be recharged from mains power.

Preferably, in use, the lid includes at least one vertically oriented side. More preferably, the battery box includes at least one relatively water sensitive electrical component electrically connectable to the battery and housed at least substantially within  
15 the lid, the electrical component having a user interface located on the vertically oriented side, thereby to inhibit damage to the electrical component as a result of water ingress.

Preferably, the battery box as defined in either aspect above includes an external battery terminal electrically connectable to a corresponding terminal of the battery, the external terminal being housed within a recess in the lid. More preferably, a protective  
20 cover is hingedly connected to the lid adjacent the recess, the cover being movable between an open configuration allowing access to the external terminal and a closed configuration providing a degree of protection to the terminal.

Preferably, the battery box includes an isolating switch movable between an on position to provide electrical connectivity between the battery and the electrical  
25 components and an off position where the electrical connectivity is broken between the

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battery and at least one of the electrical components. More preferably, when the isolating switch is moved to the off position, electrical connectivity is maintained between the battery and both the AC port and the battery condition indicator.

Preferably, the recharger is of the type allowing for continuous operative  
5 connection to the battery

Preferably, the battery box includes a recess located generally centrally within the lid and a carrying handle hingedly connected to the lid within the recess, such that when not in use the handle can be moved into a stored position wherein the handle is substantially contained within the recess.

10 Preferably, the battery box includes a waterproof membrane applied to the vertical face and extending over one or more of the user interfaces.

According to a third aspect, the invention provides an accessory for an electrical device, said accessory including:

a first electrical connector:  
15 an electrical cable connected at one end to said first connector;  
a second electrical connector connected to the other end of said cable; and  
a current regulator to limit the current passing through said accessory to less than a predetermined maximum current.

Preferably, the predetermined maximum current is less than around 15 A. More  
20 preferably, the predetermined maximum current is less than around 10 A. Even more preferably, the predetermined maximum current is less than around 6 A.

Preferably, the accessory includes a cut-out switch to limit the voltage being supplied to a device to which the accessory is connected to less than a predetermined maximum voltage. More preferably, the predetermined maximum voltage is less than  
25 around 20 V. Even more preferably, the predetermined maximum voltage is less than

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around 15 V. In a particularly preferred form, the predetermined maximum voltage is less than around 13.2 V.

Preferably, the first electrical connector is a male 12 V DC cigarette lighter plug.

Preferably, the second electrical connector is a male 12 V DC cigarette lighter  
5 plug. Alternatively, the second connector includes a pair of alligator clips.

Preferably, the current regulator is located in one of the electrical connectors.

Alternatively, the current regulator is located intermediate the first and second electrical connectors.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 Preferred embodiments of the invention will now be described, by way of example only, with reference to the following drawings in which:

Figure 1 is a perspective view of a portable water resistant lead acid battery box according to one aspect of the invention, shown in a closed configuration;

Figure 2 is a perspective view of the battery box of Figure 1, shown in an open  
15 configuration;

Figure 3 is an underside view of the battery box lid;

Figure 4 is a circuit diagram indicating the electrical connectivity of the electrical components of the battery box;

Figure 5 is a schematic view of an electrical accessory according to one aspect of  
20 the invention.

#### PREFERRED EMBODIMENTS OF THE INVENTION

Referring to the drawings, the battery box includes a body 1 for housing a lead acid battery 2, the body having a base 3 and sides 4 extending from the base to define an open top 5. A lid 6 is applicable to the body to close the top. In use, the lid has at least  
25 one generally vertically oriented side 7. Each one of a plurality of relatively water

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sensitive electrical components is electrically connectable to the battery and housed substantially within the lid. The electrical components each have a user interface located on the vertically oriented side 7 thereby to inhibit damage to the electrical component as a result of water ingress.

5           The battery box also includes a pair of external battery terminals 8 and 9 electrically connectable to corresponding terminals 10 and 11 of the battery. Each of the external terminals is housed within a respective recess 12 and 13 in a peripheral portion of the lid and is provided with a degree of protection by a protective cover 14 and 15 hingedly connected to the lid adjacent the recess. The protective cover is movable  
10   between an open position allowing easy access to the terminal as shown in Figure 2 and a closed protective position as shown in Figures 1 and 3.

Each of the external terminals includes a threaded solid brass terminal post at one end. A respective wing nut 16 and 17 is threadably engageable with its respective terminal post and includes an insulated coating to allow manual tightening of the nut  
15   without risk of electrocution. The other end of each terminal extends through the lid and terminates in a threaded portion, respectively 18 and 19. The threaded portions 18 and 19 facilitate electrical connection of the respective external terminals with the battery and other electrical components. A PVC cover (not shown) extends over the threaded portion to prevent accidental electrical shorting.

20           A polarity indicator tab (not shown) is provided on each terminal post. The tab is formed from an electrically non-conductive material and includes indicia in the form of a "+" or "-" sign respectively. The tab includes mounting aperture of diameter slightly greater than that of the respective terminal post. In use, the tab is engaged with the respective terminal post to indicate the polarity of the associated battery terminal. In



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alternative embodiments, the tab may also be colour coded to indicate the polarity of the associated terminal.

One of the electrical components is a battery recharger/conditioner 20 operable on the battery 2. The recharger/conditioner includes two user interfaces for connecting  
5 the battery to an external power source. One of the user interfaces is a 12V DC input/output port 21 to allow the battery to be recharged from a 12V power source, such as second battery (not shown), and the other is a multi-voltage AC port 22 to allow the battery to be recharged from mains power. The particular AC port shown in the drawings is suitable for use with a mains power voltage of between 100 V and 240 V. A  
10 0.25 Amp fuse 23 is included to safeguard the recharger/conditioner against overloading. The 12 V DC input/output port is protected against inverse polarity by a 1.5 Amp fuse (not able to be seen in Figures 1 to 3).

In a charging mode, the battery recharger/conditioner provides a higher charging current of 1.0 Amps until the battery has achieved a voltage of around 14.2 V. The  
15 recharger/conditioner then automatically lowers the charging current progressively to 0.1 Amps and allows the battery voltage to drop to around 13.2 V. At this point, the recharger/conditioner switches into a conditioning mode wherein a current of 0.1 Amps and a voltage of 13.2 V are supplied to the battery. The state of the battery is continuously monitored by the recharger/conditioner and if the battery charge drops  
20 below 13.2 V, the above recharging cycle is repeated.

Status indicators for charge and float are also provided by means of respective red and green LEDs 24 and 25 viewable through respective apertures in the vertical side  
7 of the battery box. The status indicators indicate whether the recharger/conditioner is operating in a charging mode indicated by the red LED or a conditioning mode indicated

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by the green LED. The recharger/conditioner also includes conditioning means to allow continuous operative connection to the battery without risking damage to the battery.

The battery box includes an isolating switch 26 to selectively electrically isolate various ones of the electrical components. The isolating switch is actuated by inserting a  
5 key 27 into an isolating switch user interface 28 and rotating the key between an on position to provide electrical connectivity between the battery and the electrical components and an off position where the electrical connectivity is broken between the battery and at least one of the electrical components. In the embodiment shown in the drawings, when the isolating switch is in the off position, electrical connectivity is  
10 broken to all of the electrical components other than the AC port and the battery condition indicator. In this way, unused components can be deactivated for safety, while still allowing the battery to be recharged using the AC port 22 and the battery condition to be checked. Due to the inclusion of this feature, it will be appreciated that the isolating switch must be in the on position when the battery is being charged using the  
15 DC port 21.

A 10 Amp circuit breaker 29 is also provided to prevent overloading of the 12V DC output/input port 21. The circuit breaker is automatically tripped when a current of greater than 10 Amps is being drawn from the 12V DC input/output port. The circuit breaker is reset by pressing a circuit breaker user interface 30.

20 The battery box also includes a battery charge indicator for detecting a charge condition of the battery. The charge indicator includes a user interface 31 located on the vertical side 7 of the battery box lid. The charge indicator user interface is electrically connected to a circuit board 32 that is in turn electrically connected to the battery 2. The circuit board is connected to four light emitting diodes (LEDs) 33, 34, 35 and 36. Each  
25 of the LEDs corresponds to a particular state of battery charge, respectively a state of

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one-quarter charge, half charge, three-quarter charge and full charge. The LEDs are displayed in an elongate window 37 provided in the vertical side of the battery box lid. A coloured window pane covers each LED. The first LED 33 is covered by a red pane, the second 34 by a yellow pane and the third 35 and fourth 36 LEDs by green panes. It

5 will be appreciated that when one of the LEDs is lit, the respective window pane is illuminated. The battery charge indicator is actuated by pressing the user interface 31, which completes an electrical circuit between the circuit board, LEDs and the battery. While the interface 31 remains pressed, the LED corresponding to the relevant state of charge, and also each LED corresponding to lower states of charge, remains lit.

10 Accordingly, when the battery contains no charge, none of the LEDs and the associated panes is illuminated. However, when the battery is in a state of one-quarter charge, only LED 33 is lit, thereby illuminating the red pane. Similarly, when the battery is in a state of half charge, LEDs 33 and 34 are lit, thereby illuminating both the red and the yellow pane. When the battery is in a state of three-quarter charge, LEDs 33, 34 and 35 are lit

15 and the associated panes are illuminated. Finally, when the battery is fully charged, all of the LEDs are lit and all of the panes are illuminated. Once the interface 31 is released, the circuit is broken between the circuit board, LEDs and the battery and all of the LEDs are extinguished.

In some embodiments (not shown), the LEDs are supplemented with indicia on

20 the vertical side of the lid, the indicia indicating the state of battery charge either graphically or numerically. It will be appreciated that in other embodiments (not shown), the charge indicator may indicate the state of battery charge in a variety of ways. For example, a clear window pane may be used in combination with coloured LEDs.

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The recharger/conditioner, circuit breaker and charge indicator are protected both from mechanical damage, and from electrical damage as a result of shorting, by a hard plastic housing 39 connected to an interior wall of the lid.

The battery box also includes a recessed carrying handle 40 located generally  
5 centrally within the lid 6. The carrying handle is hingedly connected by hinge  
formations 41 and 42 to the side walls of a central recess 43 within the lid, such that  
when not in use the handle can be rotated into a stored position wherein no part of the  
handle projects outwardly of the recess. The hinge formations are fastened to the lid by  
countersunk corrosion resistant stainless steel fasteners 44. A silicon seal (not able to be  
10 seen in the drawings) is applied around the points of contact of the hinge formations  
with the battery box lid in order to prevent ingress of water.

The battery box also includes a waterproof membrane 45 applied to the vertical  
side 7 and extending over each of the user interfaces. The membrane is continuous over  
the circuit breaker interface and the charge indicator interface. However, the membrane  
15 includes a first aperture (not able to be seen in the drawings) aligned to fit around the  
12V DC input/output port interface 21, a second aperture (not able to be seen in the  
drawings) aligned to fit around the AC port interface 22 and a third aperture (not able to  
be seen in the drawings) aligned to fit around the isolating switch interface 28. As such,  
the membrane effectively waterproofs the circuit breaker interface 30 and the charge  
20 indicator interface 31. Separate first 46, second 47 and third 48 removable  
waterproofing covers are provided to waterproof the 12V DC input/output port interface,  
the AC port interface and the isolating switch interface respectively. Each of the  
waterproofing covers is captively retained to the battery box lid by a respective retaining  
leash 49, 50 and 51. Each waterproofing cover and corresponding retaining leash is  
25 integrally formed from a suitable plastics material.

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The body 1 and lid 6 of the battery box are formed from an impact resistant and relatively chemically inert plastics material, such as polypropylene. A mounting aperture 52 and 53 is provided on longitudinally opposite outer sides of the battery box. The aperture is adapted for sliding engagement by a longitudinally slidable movable

5 locking tongue (not shown) connected to a surface (not shown) on which the battery box is to be supported. The battery box also includes a pair of retaining clips 54 and 55 releasably to secure the lid 6 in a closed position. The base of the battery box also includes a pair of longitudinal drainage channels 56 to permit flow of liquid under the box. The battery box also includes adequate ventilation apertures (not shown) in the

10 vertical walls of the recesses 12 and 13 to facilitate venting of any gases that may be produced during recharging of the battery.

It will be appreciated that the illustrated battery box may be connected to a vehicle cigarette lighter output port (not shown) to charge a battery. However, the applicant has found that if the battery box is directly connected to the vehicle cigarette

15 lighter port, the cigarette lighter port is likely to be overloaded, particularly if the battery to be charged is low in charge. Accordingly, an accessory 57 for the battery box is also provided to limit the charge drawn from the vehicle cigarette lighter port by the battery box.

The accessory 57 includes a pair of male cigarette lighter port adaptors 58 and 59

20 connected by an electrical cable 60. The accessory also includes a current regulator 61 operable between the male adaptors to limit the maximum current through the cable to 6 A. In the illustrated embodiment, the regulator is housed within one of the male adaptors. However, it will be appreciated that in other embodiments, the regulator is located at another position on the accessory, for example, intermediate the male

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adaptors. The accessory also includes a cut-out switch (not shown) to prevent the voltage of the battery being charged increasing above 13.2 V.

In an alternative embodiment (not shown), the accessory includes a single male adaptor at one end of an electrical cable and another form of electrical connector at the other end. For example, the other electrical adaptor may take the form of a pair of “alligator” clips.

In an alternative embodiment, not shown, the regulator and cut-out switch are included in the battery box lid and are operable on the 12V DC input/output port respectively to limit the current drawn by the battery during recharge and the maximum battery charge.

It will be appreciated that the illustrated embodiments of the invention provide a battery box that facilitates drainage of water away from sensitive electrical components. Accordingly, the risk of water damage to these electrical components is reduced, as is the probability of accidental electrocution. The illustrated embodiments also provide an integrated battery recharger/conditioner to allow in-situ recharging of the battery.

It will be appreciated that the illustrated battery box is well suited to use in a variety of applications where a 12V power supply is required. In particular, the battery box may be used to power 12V equipment used when boating, camping or in many other outdoor activities where a portable source of 12 V power is required or useful.

In all of the above respects, the invention represents a practical and commercially significant improvement over the prior art.

Although the invention has been described with reference to specific embodiments, it will be appreciated that it may be embodied in many other forms.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A portable water resistant lead acid battery box including;  
a body for housing a lead acid battery, said body having a base and sidewalls  
extending from said base to define an open top;  
5 a lid applicable to said body to close said top, said lid, in use, having at least one  
generally vertically oriented side; and  
at least one relatively water sensitive electrical component electrically  
connectable to said battery and housed at least substantially within said lid, said  
electrical component having a user interface located on said vertically oriented side  
10 thereby to inhibit damage to said electrical component as a result of water ingress.
2. A battery box according to claim 1 wherein said at least one electrical component  
includes a battery recharger operable on said battery, said user interface for said  
recharger being connectable to an external power source.
3. A battery box according to claim 2 including two user interfaces for said  
15 recharger, a first recharger interface being a DC port to allow said battery to be  
recharged from a 12V power source and a second recharger interface being an AC port  
to allow said battery to be recharged from mains power.
4. A battery box according to any one of the preceding claims wherein said  
recharger is of the type providing a higher charging current until said battery is close to  
20 its rated capacity and then switching to a lower conditioning current.
5. A battery box according to claim 4 wherein said higher charging current is  
around 1.0 Amps and said conditioning current is around 0.1 Amps.
6. A portable lead acid battery box including:  
a body for housing a lead acid battery, said body having a base and sidewalls  
25 extending from said base to define an open top;

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a lid applicable to said body to close said top; and

a battery recharger for recharging the battery, said recharger being contained at least substantially within a volume defined by said body and said lid.

7. A battery box according to claim 6 wherein said recharger is of the type  
5 providing a higher charging current until said battery is close to maximum capacity and then switching to a lower conditioning current.
8. A battery box according to claim 7 wherein said higher charging current is around 1.0 Amps and said conditioning current is around 0.1 Amps.
9. A battery box according to any one of claims 6 to 8 including two user interfaces  
10 for said recharger, a first recharger interface being a DC port to allow said battery to be recharged from a 12V power source and a second recharger interface being an AC port to allow said battery to be recharged from mains power.
10. A battery box according to any one of claims 6 to 9 wherein, in use, said lid includes at least one vertical side.
- 15 11. A battery box according to claim 10 including at least one relatively water sensitive electrical component electrically connectable to said battery and housed at least substantially within said lid, said electrical component having a user interface located on said vertically oriented side, thereby to inhibit damage to the electrical component as a result of water ingress.
- 20 12. A battery box according to claim 11 wherein said at least one electrical component includes said recharger.
13. A battery box according to any one of the preceding claims including an external battery terminal electrically connectable to a corresponding terminal of said battery, said external terminal being housed within a recess in said lid and a protective cover hingedly  
25 connected to said lid adjacent said recess, said cover being movable between an open



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configuration allowing access to said external terminal and a closed configuration providing a degree of protection to said terminal.

14. A battery box according to any one of the preceding claims including an isolating switch movable between an on position to provide electrical connectivity between said battery and said electrical components and an off position where said electrical connectivity is broken between said battery and at least one of said electrical components.

15. A battery box according to claim 14 wherein when said isolating switch is moved to said off position, electrical connectivity is maintained between the battery and both the AC port and the battery condition indicator.

16. A battery box according to any one of the preceding claims wherein said recharger is of the type allowing for continuous operative connection to said battery.

17. A battery box according to any one of the preceding claims including a waterproof membrane applied to said vertical face and extending over one or more of said user interfaces.

18. An accessory for an electrical device, said accessory including:  
a first electrical connector;  
an electrical cable connected at one end to said first connector;  
a second electrical connector connected to the other end of said cable; and  
a current regulator to limit the current passing through said accessory to less than a predetermined maximum current.

19. An accessory according to claim 18, wherein the predetermined maximum current is less than around 15 A.

20. An accessory according to claim 18, wherein the predetermined maximum current is less than around 10 A.

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21. An accessory according to claim 18, wherein the predetermined maximum current is less than around 6 A.
22. An accessory according to any one of claims 18 to 21, wherein the accessory includes a cut-out switch to limit the voltage being supplied to a device to which the  
5 accessory is connected to less than a predetermined maximum voltage.
23. An accessory according to claim 12, wherein the predetermined maximum voltage is less than around 20 V.
24. An accessory according to claim 12, wherein the predetermined maximum voltage is less than around 15 V.
- 10 25. An accessory according to claim 12, wherein the predetermined maximum voltage is less than around 13.2 V.
26. An accessory according to any one of claims 18 to 25, wherein the first electrical connector is a male 12 V DC cigarette lighter plug.
27. An accessory according to any one of claims 18 to 26, wherein the second  
15 electrical connector is a male 12 V DC cigarette lighter plug.
28. An accessory according to any one of claims 18 to 26, wherein the second connector includes a pair of alligator clips.
29. An accessory according to any one of claims 18 to 28, wherein the current regulator is located in one of the electrical connectors.
- 20 30. An accessory according to any one of claims 18 to 28, wherein the current regulator is located intermediate the first and second electrical connectors.

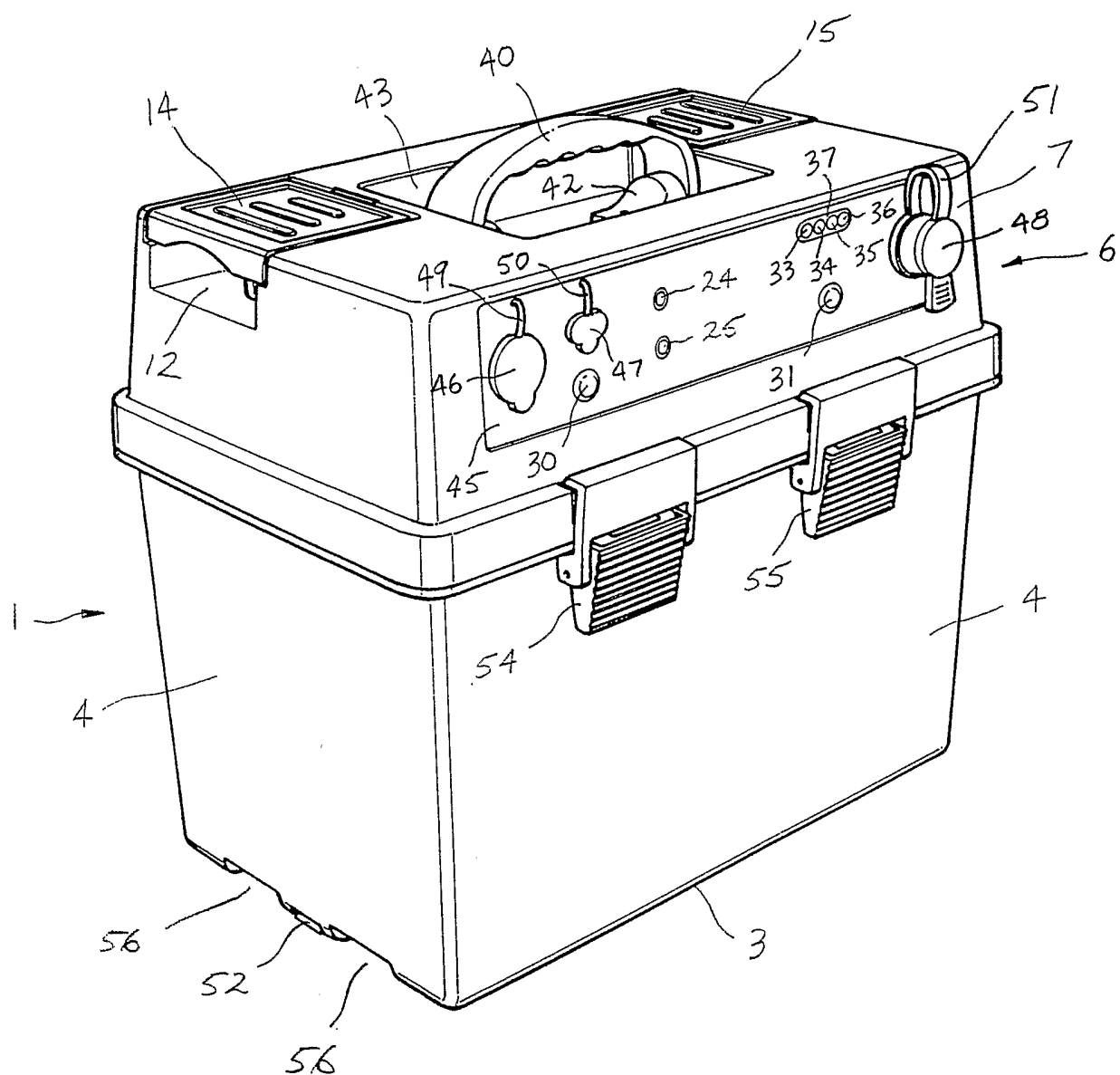


FIG. 1

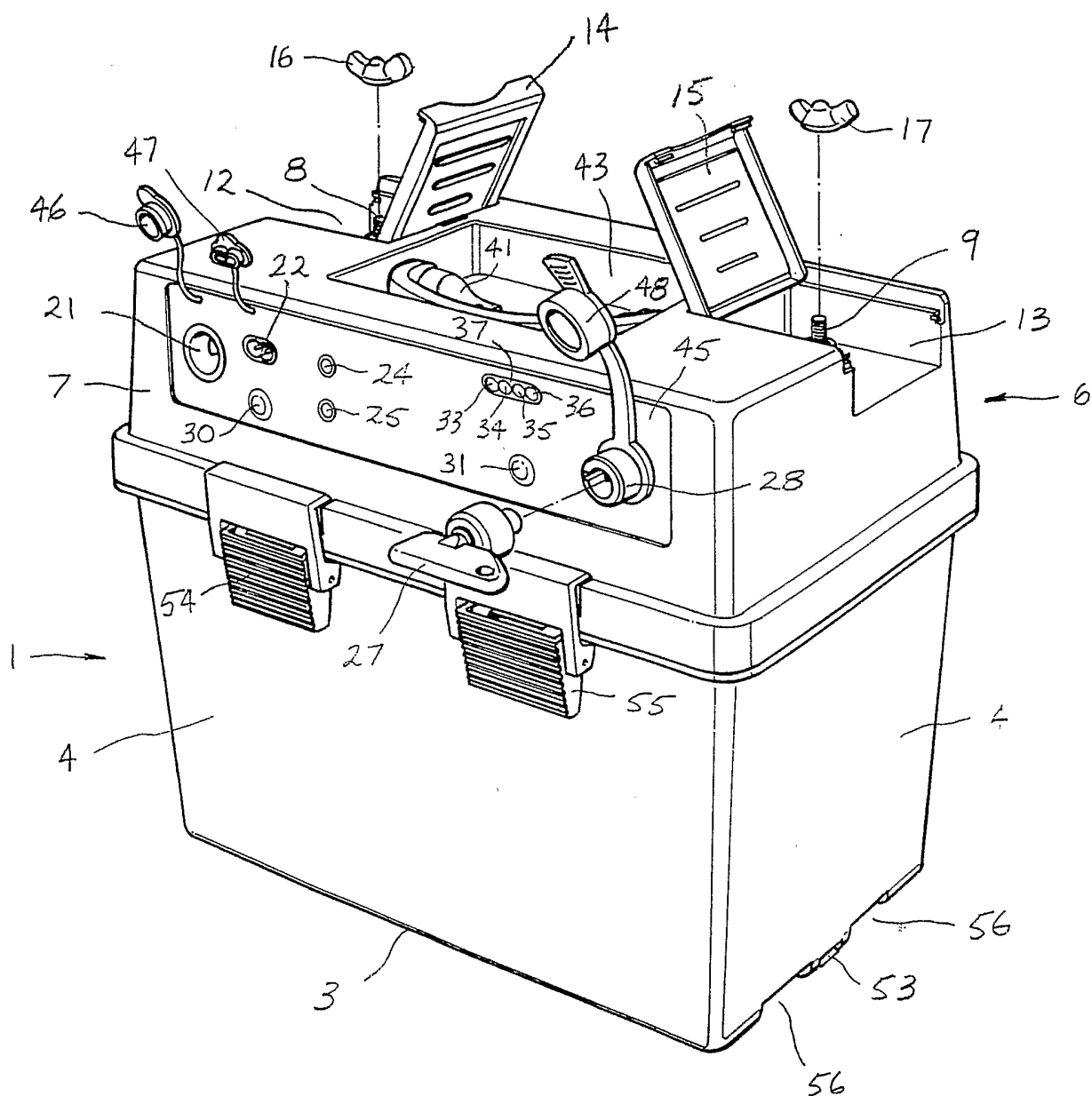


FIG. 2

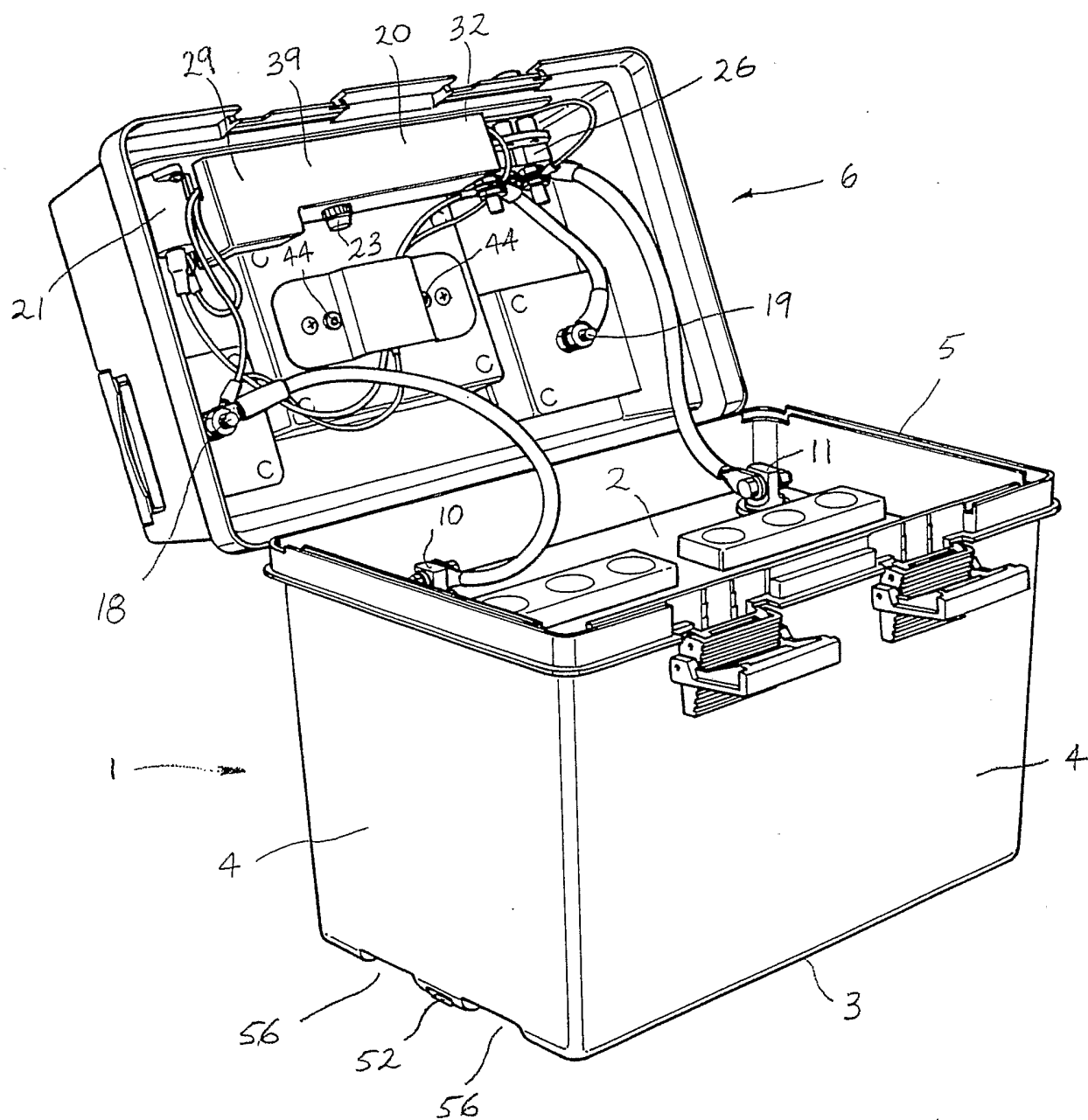


FIG. 3

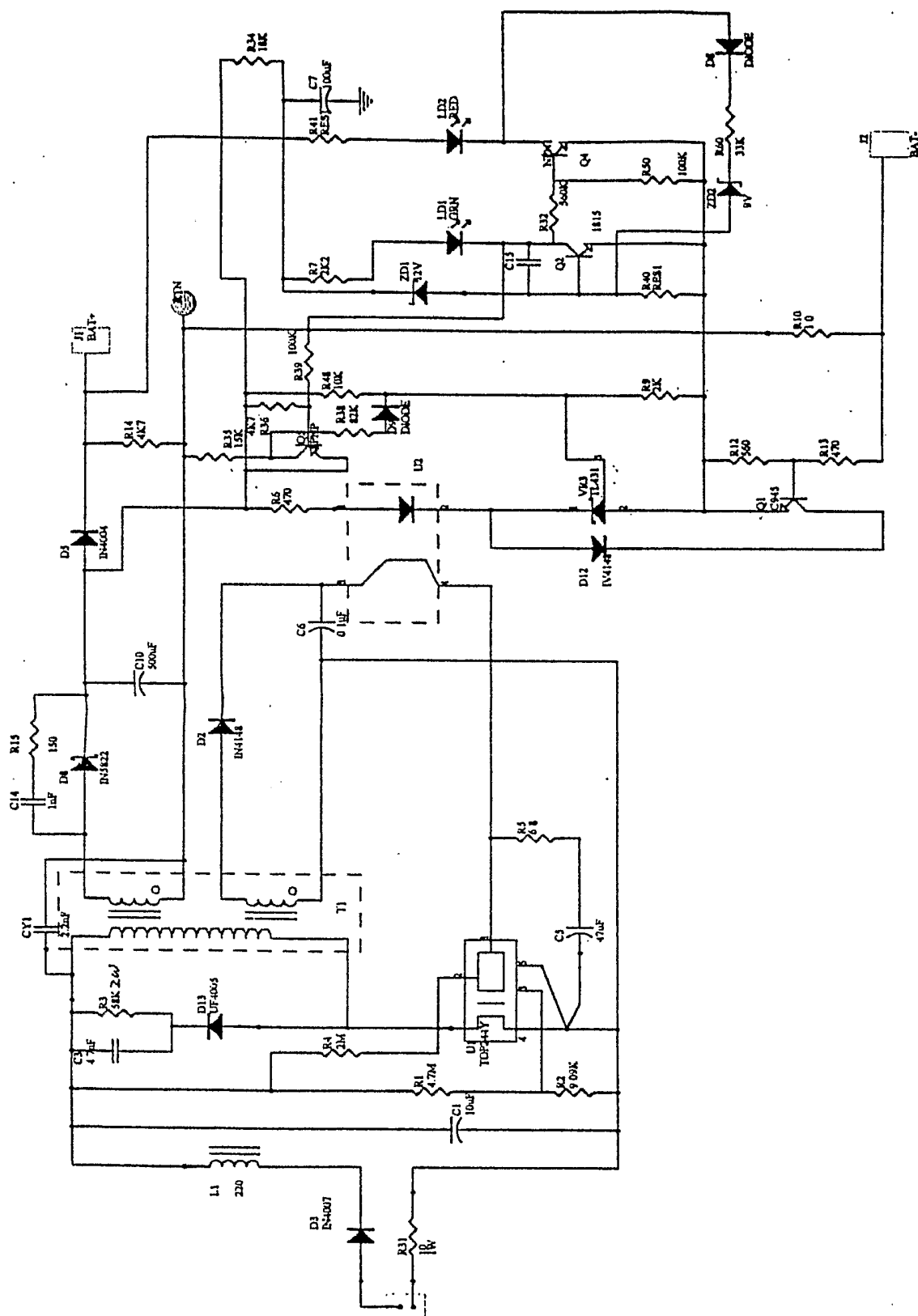
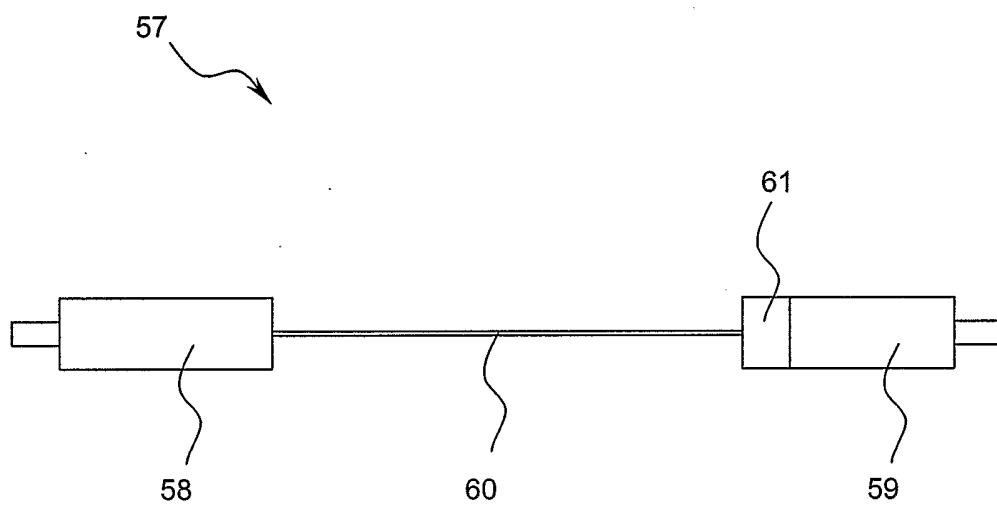


FIG. 4

**FIG. 5**

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU03/01179

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int. Cl. <sup>7</sup> : H01M 2/10		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Derwent DWPI: B65D 85/88, H01M 2/10, 10/- and keywords BOX, HOUSING, LEAD ACID, LID		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
O,X	Portable Battery Packs, 26 August 2001 [retrieved on 5 November 2003]. Retrieved from the internet: URL: <a href="http://www.solar-dc-marine.com/SDMWAECO/raps_batteries.htm">http://www.solar-dc-marine.com/SDMWAECO/raps_batteries.htm</a>	1-17
A	US 5077513 A (DEA et al) 31 December 1991	
A	DE 20207721 U1 (AKKUMULATORENFABRIK MOLL GMBH & CO. KG) 14 August 2002	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
Date of the actual completion of the international search 6 November 2003		Date of mailing of the international search report 12 NOV 2003
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: <a href="mailto:pct@ipaaustralia.gov.au">pct@ipaaustralia.gov.au</a> Facsimile No. (02) 6285 3929		Authorized officer  <b>MATTHEW FRANCIS</b> Telephone No : (02) 6283 2424



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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6222342 B1 (EGGERT et al) 24 April 2001	

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### Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos :  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos :  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

### Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-17 relate to a battery box that has a water sensitive component and user interface within the lid. It is considered that the location of a water sensitive component and user interface within the lid comprises a first "special technical feature".
2. Claims 18-30 are directed to a cable with connectors on both ends and including a current regulating device. It is considered that inclusion of a current regulating device comprises a second "special technical feature".
1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-17

#### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
US	5077513				
DE	20207721				
US	6222342	AU	76275/00	CA	2314728
		WO	0211264	EP	1305865
					END OF ANNEX