SEARCH LIGHT WITH REMOTE CHARGER

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Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 327 days.

Filed: Dec. 28, 2006

Related U.S. Application Data


Int. Cl.

H02J 7/00 (2006.01)
F21L 4/02 (2006.01)

U.S. Cl. 320/113; 320/107; 362/183

Field of Classification Search 320/106, 320/107, 109, 110, 111, 112, 113, 114, 115, 320/137, 162, 361/669, 670, 671; 439/500, 439/504, 511, 522, 626, 627; 362/157, 158, 362/159, 193, 192, 193, 200, 208; D2637, D2638, 41, 44, 46, 48, 50, 51, 52, 63; 710/303, 703/303, 304; D14/434

See application file for complete search history.

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A battery charging station having a main docking station to recharge the battery while the battery is installed in a electrical device and a second charging station that can be removed from the main base is disclosed. The removable charging station allows a user to charge a battery not in use at a remote location from the docking station. If the second charging station is attached to the docking station, the battery in the removable charging station is charged after the battery installed in the light is charged.

12 Claims, 6 Drawing Sheets
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SEARCH LIGHT WITH REMOTE CHARGER

CROSS REFERENCE APPLICATIONS

This application is a continuation in part of application Ser. No. 29/247,104 filed May 31, 2006.

BACKGROUND

Battery powered search lights are well known in the art. The problems associated with ensuring that a charged battery is available are also well known in the art. Current prior art lights often have charging stations that allow the battery to be charged while in the light and some have a second slot to allow the user to charge a spare battery.

The foregoing example of the related art and limitations related therewith are intended to be illustrative and not exclusive. Other limitations of the related art will become apparent to those of skill in the art upon a reading of the specification and a study of the drawings.

SUMMARY

An aspect of the present device is to provide for a battery charging station that can be located at a remote location from the main charging station.

The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tool and methods which are meant to be exemplary and illustrative, not limiting in scope. In various embodiments, one or more of the above described problems have been reduced or eliminated, while other embodiments are directed to other improvements.

The present device has a battery charger that can be removed from the main base, allowing a user to charge a battery not in use at a remote location from the main base. If the battery charger is attached to the main base, the battery is charged after the battery installed in the light is charged.

In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side perspective view of the device with the charging stations attached to each other with the motion of the release lever shown in dotted lines.

Fig. 2 is a side perspective view of the device with the charging stations attached to each other.

Fig. 3 is a bottom plan view of the device with the charging stations attached to each other.

Fig. 4 is a bottom plan view of the device with the charging stations separated.

Fig. 5 is an exploded view of the device.

Fig. 6 is a flow chart of the control logic of the depicted embodiment.

Fig. 7 is a circuit schematic for the primary charge control function as discussed in the flow chart of Fig. 6.

Fig. 8 is a circuit schematic for the remote charging control.

Before explaining the disclosed embodiment of the present invention in detail, it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown, since the invention is capable of other embodiments. Exemplary embodiments are illustrated in referenced figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered illustrative rather than limiting. Also, the terminology used herein is for the purpose of description and not of limitation.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring first to Fig. 1, the unit 100 has a light docking station 101 with a charging location 104 that is adapted to fit a search light 102 with a removable, rechargeable battery 103. The rechargeable battery 103 can be located on the search light such that the battery is near the body of the light that contacts the docking station 101.

Electrically connected to one side of the light docking station 101 is a remote charging station 106 for a second rechargeable battery 103. Both the docking station 101 and the remote charging station 106 have charging circuits to charge a battery and control circuitry, as will be discussed below.

The disclosed embodiment is shown and discussed in terms of a search light with a rechargeable battery. It is to be understood that the device is not limited to a search light, any hand held electrical device that is powered by rechargeable batteries could use a docking station and remote charging station as disclosed.

Search light 102 can be locked down into charging location 104 and can be released via release lever 105. The lock (not shown) is spring loaded to automatically lock into place when the light 102 is placed in the charging location 104 to prevent the light 102 from falling out of the light docking stations 101. This allows the light docking station 101 to be mounted in a motor vehicle or other moving location and have the light 102 remain in the light docking station 101 while the vehicle is in motion. The lock also ensures a good contact with the contact plates 107 in the charging location 104 with electrical contacts in the base of the search light 102 to allow current flow during charging. The contact plates 107 are electrically connected to the charging circuit such that when the contacts of the light connect to the contact plates 107 of the charging location a complete circuit is formed.

Power is provided to the light docking station 101 and remote charger 106 by power cords 109, 110 as seen in Figs. 3 and 4. Power converter 120 is a standard converter available in two models (120vAC or 220vAC) and will take wall receptacle input of either 120v or 220v respectively and provide a DC power output of 12vDC.

Search light 102 can also be charged as a standalone unit, that is when not connected to docking station 101. In such an instance, an 18VDC a female plug 121 (not directly visible) located at the rear of search light 102 will take male 18vDC plug 122 which is the output plug of power converter 120. Indicator lights 111 can be provided to indicate the charging status of batteries and/or if the search light 102 is turn on.

Thus, the battery in search light 102 can be charged directly through power converter 120 or through docking station 101. In the disclosed embodiment in Fig. 4, power coming into the docking station 101 via power cord 109 is converted from 12 volt DC to 18 volt DC power via converter 108. This cord can be hard wired into the side of docking station 101 or be plugged in. Alternatively, power cord 110 can be connected to standard 110-120V sources, or a 220V converter can be used.

The light docking stations 101 is connected to battery charging station 106 via interlocking connector pieces 112 and 113. In the depicted embodiment, the connector pieces are a bayonet type lock. Other known in the art connector
systems could be used as well. The connector pieces must provide a snug fit to allow contact points (not shown) to
electrically connect the battery charging station 106 to the
light docking station 101. Alternatively, a plug connection
could be provided such that the user would manually plug the
battery charging station 106 into a receptacle on light docking
station, or vice versa. In one embodiment, the power connec-
tion point is located on connector piece 113, such that the
power connection point is blocked when the battery charging
stations 106 is attached to the docking station 101. This pre-
vents two power cords being plugged into the joined unit to
reduce the complexity of the circuitry.

Battery charging station 106 is charged by power cord 110
when not electrically connected to the docking station, as
seen in FIG. 4. Battery charging station 106 also has a power
converter 108. Other voltages or current types for both input
and charging voltage or current can be varied depending on
application and location.

FIG. 6 is a flow diagram of the control circuitry of the unit
100. If the circuitry senses a light 102 with a battery 103 in the
light docking station 101 (block 1), a sensor checks to see if
the battery 103 installed in the light 102 is charged (block 2).
If the battery 103 is not charged (line 3), power is directed to
the main charging circuit in light charging station 101 to
charge the battery 103 (block 4) installed in the light 102.
Once the sensor detects that battery 103 in the light 102 is
charged (block 5), the sensor checks to see if there is a battery 103
in the remote charger 106 that needs charging (block 6).
If the battery 103 in the remote charging station needs charg-
ing (block 7) and the battery in the main charging unit is
charged or not present, the battery in the remote charging unit
is charged using secondary charging circuit.

If desired, additional control circuitry and controls can be
provided that would allow the user to select which battery was
charged first.

If the remote charger 106 is removed from the light docking
station and plugged into a power source a battery 103 placed
in the remote charging station 106 is immediately charged.
So, if a user wished to charge both batteries 103 as quickly as
possible, the charging units should be separated from each
other electrically, and plugged in separately. Another option
is to have two remote charging stations 106, one plugged into
the docking station and another kept at a remote location
requiring only a DC wall converter 110. This could be con-
venient for someone having one additional battery.

There are three basic circuits in addition to a simple wall
converter (AC/DC) that provides a 12VDC output (ref. 110 in
FIGS. 3, 4). A simple 12VDC to 18VDC power converter 108
(ref. FIGS. 3, 4), circuit not shown, is located underneath light
docking station 101. It receives a 12VDC input and converts it
to a 18VDC output. Remote charging station 106 has a
control circuit that will be discussed below in FIG. 8. Search
light 102 contains a control circuit for all switching which
will be discussed below in FIG. 7.

FIG. 7 is a schematic for the primary charge control circuit
700 with the function as discussed in the aforementioned flow
chart of FIG. 6. Primary charge control circuit 700 shown is
one embodiment of the control circuit and is shown by way of
example and not of limitation. Primary charge control circuit
700 includes control circuit A. One skilled in the art could
design numerous circuits to perform the same control func-
tion. Primary charge control circuit 700 is multi-functioned
and controls all switching functions while providing charge
priority control as discussed in FIG. 6. It receives the primary
18VDC input from power converter 108 and contains the
on/off switch for powering search light 102. It recognizes
which battery 103 is charged and provides priority to charg-
ing the main light battery versus the secondary charger bat-
tery, if present. It provides 18VDC power to the remote
charge control circuit of FIG. 8 below.

FIG. 8 is a schematic for the remote charging control circuit
800 located within remote charging station 106 (ref. FIGS. 1,
3, 4, 5). Primary charge control circuit 700 detects the pres-
ence of a remote battery within remote charging station 106.
If the primary battery is charged and the remote battery is
detected as not charged, then remote charging primary charge
control circuit 700 will provide 18VDC power to remote
charging control circuit 800, which includes control circuit B,
until the remote battery is fully charged. Remote charging
circuit 800 performs charge control of the remote battery. It should be noted that anyone skilled in the art could
design numerous circuits to perform the same control func-
tion.

While a number of exemplary aspects and embodiments
have been discussed above, those of skill in the art will rec-
ognize certain modifications, permutations, additions and
sub-combinations therefore. It is therefore intended that the
following appended claims hereinafter introduced are inter-
preted to include all such modifications, permutations, addi-
tions and sub-combinations are within their true sprit and
scope. Each apparatus embodiment described herein has
numerous equivalents.

We claim:

1. A charging station for batteries comprising:
a docking station for an electrical device powered by a
battery, said electrical device having a first battery
installed therein and contact points electrically con-
ected to the battery;
the docking station having a power source and a charging
location;
the charging location having a charging circuit and contact
points electrically connected to the charging circuit;
the charging location configured to receive the electrical
device and first battery such that the contact point of the
electrical device and the contact points of the charging
location are in electrical contact, forming a complete

circuit functioning to recharge the first battery;

2. The charging station for batteries of claim 1 further
comprising at least one power converter to convert at least one
of the voltage or current.

3. The charging station for batteries of claim 1 further
comprising at least one sensor to detect if a battery requires
charging when said battery is electrically connected to the
charging station.

4. The charging station for batteries of claim 3, further
comprising a control circuit attached to the first sensor, the
control circuit functioning to cause the charging circuit to
charge the first battery when the sensor detects the first battery
is not fully charged and to discontinue charging once the first
battery is fully charged.
5. The charging station for batteries of claim 4 further comprising a second sensor in the battery charging station to detect if the second battery is charged and the control circuit controlling which battery is charged first if both batteries are not fully charged.

6. The charging station for batteries of claim 5 wherein the first battery is charged first.

7. The charging station of claim 1 wherein the electrical device is a searchlight.

8. A battery operated search light and charging system comprising:
   the search light being powered by a removable and rechargeable first battery installed therein and contact points electrically connected to the battery;
   a docking station for the search light, the docking station having a power source and a control circuit;
   a charging circuit having contact points, said charging circuit electrically connected to the control circuit;
   the docking station configured to receive the search light with the battery installed such that the contact point of the electrical device and the contact points of the control circuit are in electrical contact, forming a complete circuit functioning to recharge the battery; a battery charging station configured to be removable attached to the docking station; the battery charging station having a slot to receive a second battery;

9. The slot being configured such that when the second battery is seated in the slot the battery is electrically connected to the battery charging station, allowing the second battery to be charged;
   the battery charging station having a connection mode in electrical connection to the docking station to provide electrical power to charge the second battery; and
   the battery charging station having a stand alone mode when connected to an alternative power source and when not connected to the docking station.

10. The battery operated search light and charging system of claim 8 further comprising at least one power converter to convert at least one of the voltage or current.

11. The battery operated search light and charging system of claim 10 further comprising a first sensor attached to the control circuit, the control circuit functioning to cause the charging circuit to charge the first battery when the sensor detects the first battery is not fully charged and to discontinue charging once the first battery is fully charged.

12. The charging station for batteries of claim 11 further comprising a second sensor in the battery charging station to detect if the second battery is charged and the control circuit controlling which battery is charged first if both batteries are not fully charged.

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