Title: MOBILE PHONE CHARGER WITH INBUILT ENERGY MANAGEMENT SYSTEM

Abstract: A mobile phone charger with an inbuilt energy management system is provided. The charger comprises an optical coupler, a high voltage AC to DC converter, a transformer, a switching IC, a low voltage AC to DC converter, and a feedback circuit. The charger determines whether the connected phone is fully charged or is still charging by sensing the current. The charger cuts off the power supplied to the phone as soon as the phone gets fully charged, thereby eliminating the possible power loss.
MOBILE PHONE CHARGER WITH INBUILT ENERGY
MANAGEMENT SYSTEM

Field of the Invention
The present invention relates to a mobile phone charger with an inbuilt energy management system which is capable of reducing power loss while charging mobile phone. By reduction of power loss the said phone is capable of reduction in cost also. The inbuilt energy management system determines whether the phone is fully charged or under going charging process by sensing the current used in both situations. After sensing whether the phone is fully charged the system cuts off the power supply automatically thereby eliminating possible power loss.

Background of the Invention
Energy consumption is not done in smart ways. Wastage of energy is one of the major issues presently being faced by the world. For instance there is wastage of energy via excess charging of mobile phones. People used to put their mobile phones for charging and they will forget to unplug it. So finally there will be loss of power and sometimes battery will also collapse. This type of power wastage has to be avoided.

The present invention is intended to provide a mobile phone charger with an inbuilt energy management system which is capable of eliminating possible power loss in mobile chargers at the time of charging.

The present mobile charger eliminates the possible power loss after the phone is fully charged or when the charger is connected to the power supply without phone.

Object of the present Invention
The primary object of the present invention is to provide a mobile charger with an inbuilt energy management system which is capable of eliminating possible power loss in the chargers at the time of charging.

Still another object of the present invention is to provide a mobile charger which has fully automatic operation to disconnect the power supply as soon as the phone is fully charged.

Yet another object of the present invention is to provide a mobile phone charger where manual switch off of the charger is not required.
Other object of the present invention is to provide a mobile phone charger with an inbuilt energy management system which is capable of saving about 97% of phantom power loss.

Another object of the present invention is to provide a charger with a **L.E.D** that works as a charging indicator and after the mobile gets fully charged the **L.E.D** flashing will be off and charger will be automatically disconnected from mains.

Still another object of the present invention is to provide a mobile charger which will prevent the over charging of the battery so as to enhance the life of the battery.

**Brief description of the drawing**

Fig: 1 shows the block diagram of the mobile charger with an inbuilt energy management system in accordance with the present invention.

**Detailed Description of the Invention**

The present invention provides a mobile charger with an inbuilt power saving mechanism. It comprises of two parts (a) Normal charging Circuit (b) Power saving Circuit. Normal charging circuit will provide the required current and voltage to charge a mobile. Power saving circuit is capable of switching off power as soon as charging gets completed.

The mobile charger with an inbuilt energy management system in accordance with the present invention comprises of optocoupler, AC to DC converter, transformer, switching circuit, feedback circuit. AC to DC converter can be either high voltage AC to DC converter or low voltage AC to DC converter. Feedback circuit includes voltage feedback circuit and current feedback circuit.

As shown in Fig: 1 the high voltage AC is given to AC to DC converter through an optocoupler. The optocoupler acts as an electronic switch to control the power drawn by the circuit. The high voltage input AC is converted to high voltage DC using an AC to DC converter and is given to transformer in serial with an optocoupler and a switching IC. The high frequency switching IC chops the DC and drives the transformer. The low voltage AC output of the transformer is converted into DC by the
low voltage AC to DC converter. The output DC is stabilized by a voltage feedback arrangement.

The current feedback arrangement is used to shutdown the entire circuit once there is no flow of current to the mobile ie, when the phone is fully charged. When the phone is fully charged the current taken by it will become a small value compared to the charging time and this reduction in current consumption is assumed as the fully charged state and the optocoupler switches off the current input.

The additional components inbuilt in the existing mobile charger are (a) optocoupler ie, MOC 3021, (b) current sensing and amplifier IC LM 358, (c) MOV 14N431K (d) feedback resistance (e) series load resistance. There is no modification required in the external appearance of the existing mobile charger and customer can just connect the mobile charger in accordance with the present invention to the mobile and plug to the main supply.

In the mobile charger in accordance with the present invention comprises of a very low value resistance is connected series with voltage output and mobile. Once the current flows through the said load resistance a minor voltage drop occurs across the resistance. The said voltage is amplified 200 times by a low current amplifier and given to the optocoupler ie, to control the input supply of the main charging circuit. By the above process a voltage feedback and current feedback are carried out in the mobile charger in accordance with the present invention. The mobile charger in accordance with the present invention is provided with a L.E.D that works as a charging indicator and after the mobile gets fully charged the L.E.D flashing will be off and charger will be automatically disconnected from mains.

Advantages of the present Invention

Normally a mobile gets over charged, if it is not disconnected after the battery gets fully charged. And this over charging will cause damage to the battery and the charging circuit and also reduces the life of the battery. So the mobile charger in accordance with the present invention eliminates the fore mentioned problems. Other advantages are energy conservation, fully automated operation, avoiding manual switch off of the mobile charger.
Generally a power loss will occur even after the mobile charger gets disconnected from the charger, if the main of charger unit is not turned off. This type of phantom loss varies from 1 watt to several watts. The mobile charger in accordance with the present invention will make the circuit switch off the main supply after the mobile is completely charged. So the mobile charger in accordance with the present invention is capable of saving 97% of phantom power loss.
I Claim:

1. A mobile phone charger with an inbuilt energy management system which is capable of determining whether the connected phone is fully charged or still charging by sensing the current and automatically cuts off the power supplied to it as soon as phone gets fully charged thereby eliminating the possible power loss comprising:

   an optocoupler to control the power drawn by the circuit;
   a high voltage AC to DC converter for converting high voltage input AC to high voltage DC;
   a transformer;
   a switching IC;
   a low voltage AC to DC converter for converting low voltage AC output to low voltage DC;
   a switching circuit;
   a feedback circuit including a voltage feedback circuit and a current feedback circuit;

   wherein the converted high voltage AC to DC by AC to DC converter is given to the transformer in serial with the optocoupler and the switching IC and said switching IC chops the DC and drives the said transformer;

   wherein the low voltage AC output of the said transformer is converted into DC by low voltage AC to DC converter and the output DC voltage is stabilized by the said voltage feedback arrangement and the current feedback arrangement is capable of shutting down the entire circuit as soon as it senses there is no flow of current to the mobile phone.

2. The mobile phone charger as claimed in claim 1, wherein the system determines the current consumption during charging time and when it senses a reduction in the current consumption, the optocoupler switches off the current input to eliminate the possible power loss.

3. The mobile phone charger as claimed in claims 1 and 2, wherein the system further comprises of an LED as a charging indicator.
4. The mobile phone charger as claimed in claims 1 to 3, wherein the feedback circuit comprises of current sensing and amplifier IC, feedback resistance and series load resistance.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

H02J7/02(2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC: H02J7/–, H01M10/–

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)

WPI, EPODOC, CNKI, CNPAT: optocoupler, optical coupler, voltage feedback, current feedback, fully charge+, shut down, disconnect

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Category</th>
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<th>Relevant to claim No.</th>
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<td>Y</td>
<td>CN2294540Y(YTNTG, Huiming) 14 October 1998(14.10.1998) specification: page 1, lines 1-3, page 4, line 15 - page 6, line 23 ; figures 2-4</td>
<td>1-4</td>
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<td>Y</td>
<td>CN101521401A(KONKA GROUP CO., LTD.) 02 September 2009(02.09.2009) specification: page 3, lines 10-16, figure 1</td>
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<td>A</td>
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**See patent family annex.**

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* Special categories of cited documents:
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"&" "document member of the same patent family

**Date of the actual completion of the international search**

11 February 2011 (1.02.2011)

**Date of mailing of the international search report**

10 Mar. 2011 (10.03.2011)

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