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Yu

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(54) **MULTI-FUNCTIONAL CHARGER WITH POWER GENERATING AND ILLUMINATION FUNCTIONS**

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(73) Assignee: **Daniel Tai**, Naperville, IL (US)

(21) Appl. No.: **11/349,522**

(22) Filed: **Feb. 8, 2006**

Related U.S. Patent Documents

Reissue of:

(64) Patent No.: **6,690,141**
Issued: **Feb. 10, 2004**
Appl. No.: **10/233,828**
Filed: **Sep. 3, 2002**

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H01M 10/46 (2006.01)

(52) **U.S. Cl.** **320/107**

(58) **Field of Classification Search** ..... 320/101, 320/107, 112, 113, 114, 115; 310/80, 83, 310/75 R, 67 A, 67 R; 290/1 C
See application file for complete search history.

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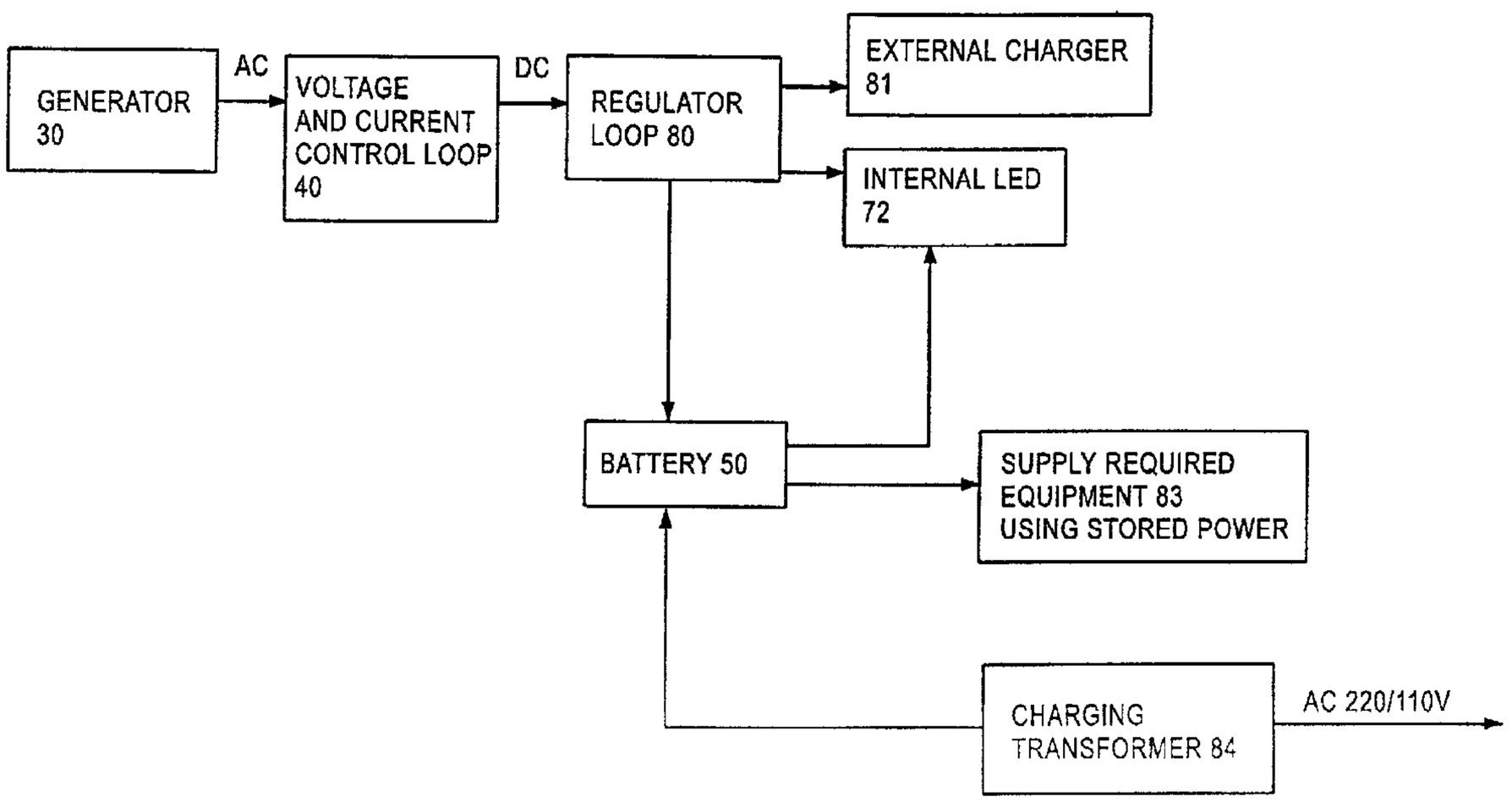
(74) *Attorney, Agent, or Firm*—Michael P. Mazza, LLC

(57) **ABSTRACT**

A multi-functional charger with power generating and illumination functions comprises a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod. When the movable rod rotates, the generator will operate by the driving of the gear set so as to generate a current. The current is suppressed, rectified and regulated by the voltage and current control loop. It can be determined to be stored in the battery or outputted through a plug by the switching of the switch. The power stored in the battery can be supplied to the LED lamp or to be outputted. When the power is outputted, a plug serves to be connected to an electric device to be charged. To achieve the requirement of illumination, the generator is connected to an external bulb set. Thereby, the charger can be used in various applications.

21 Claims, 7 Drawing Sheets



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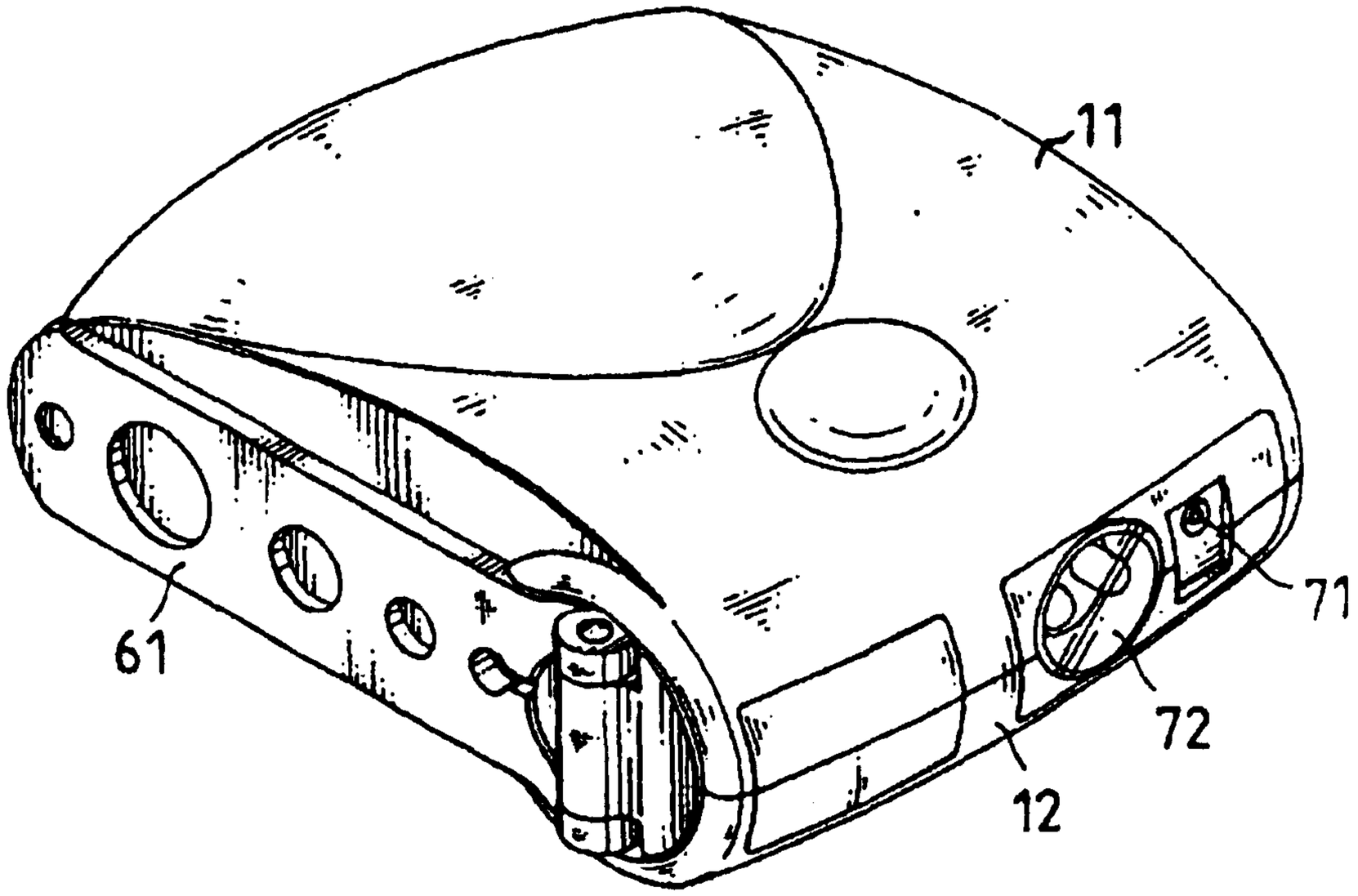
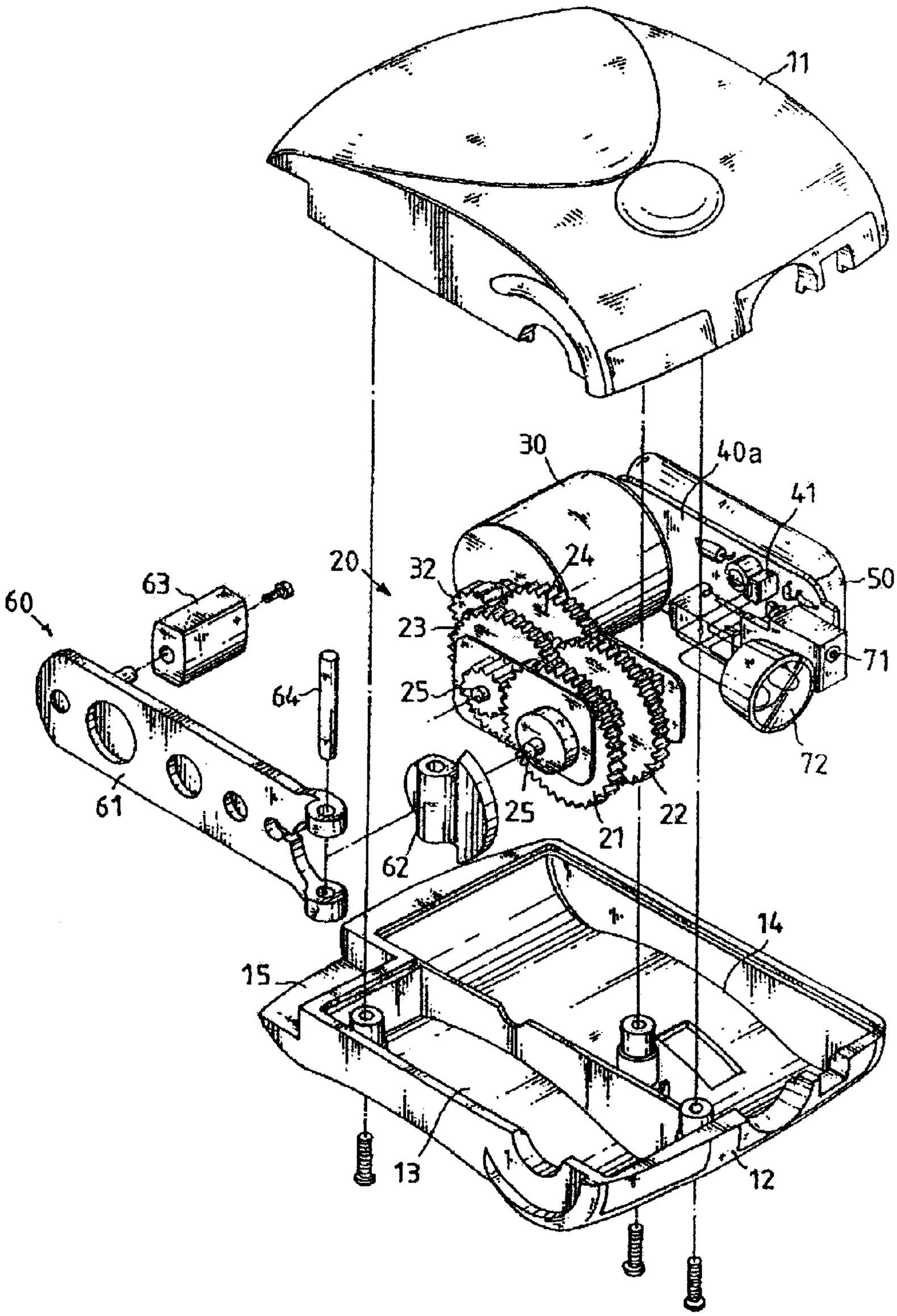


FIG. 1

FIG. 2 Amended



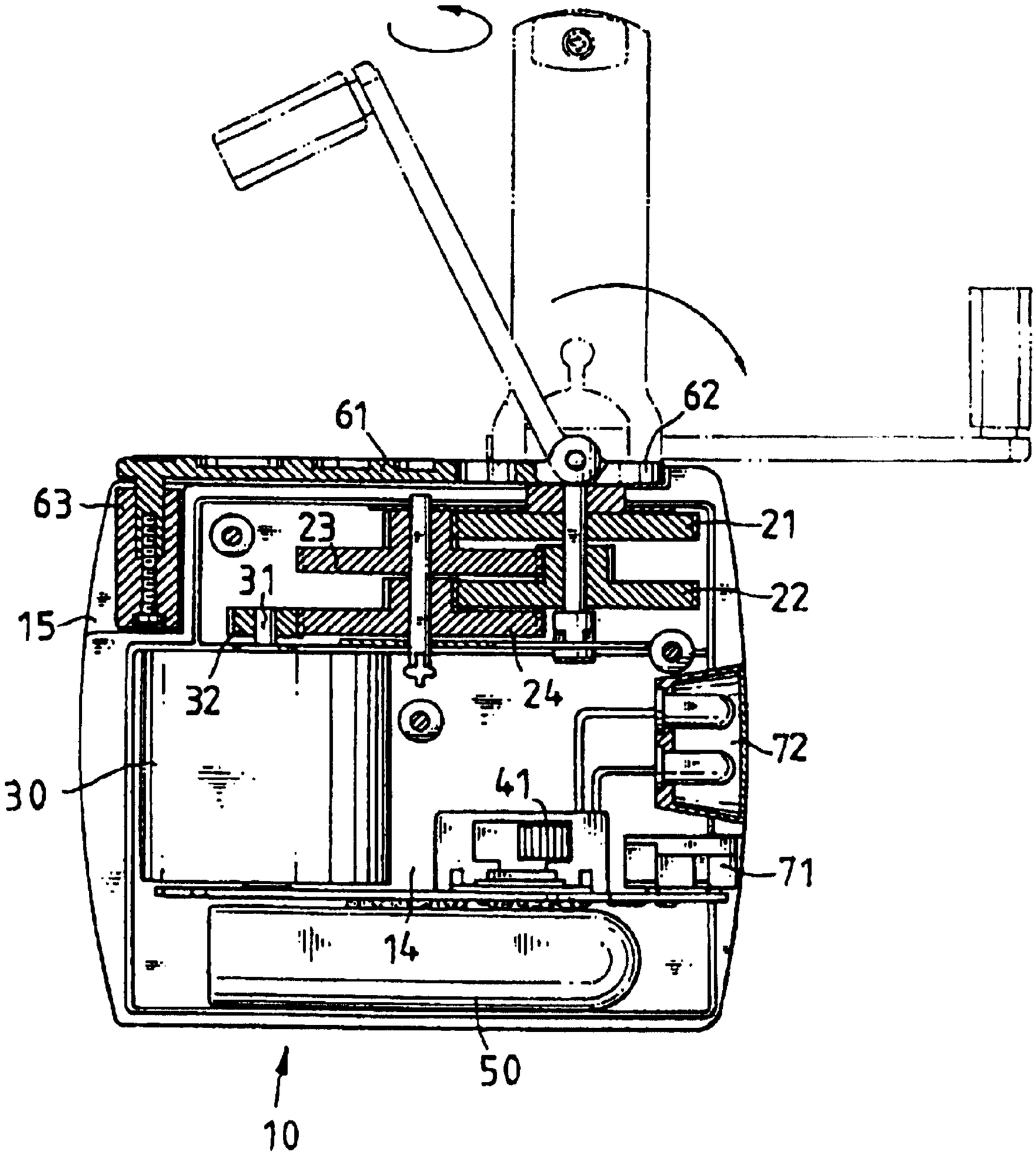


FIG. 3

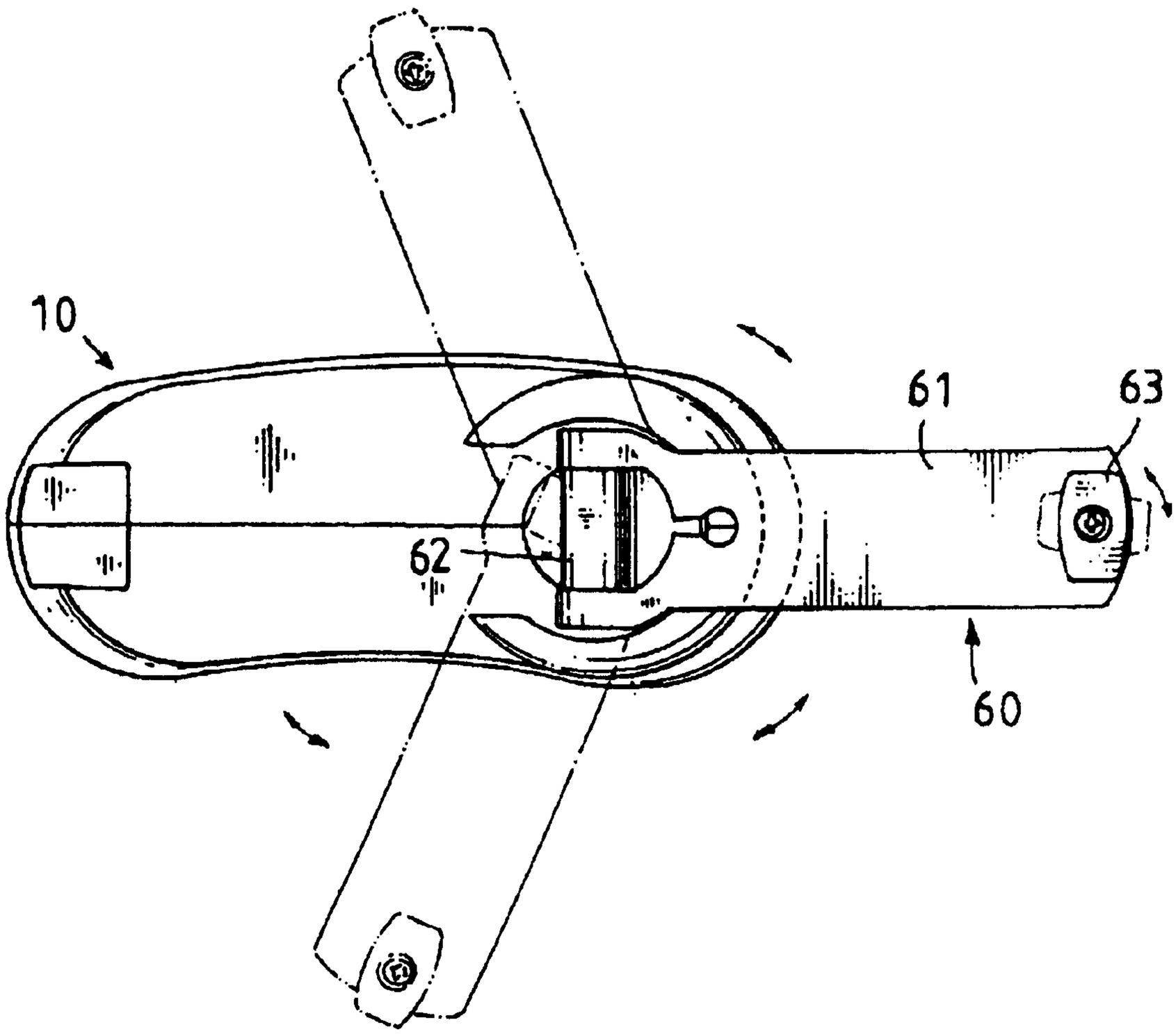
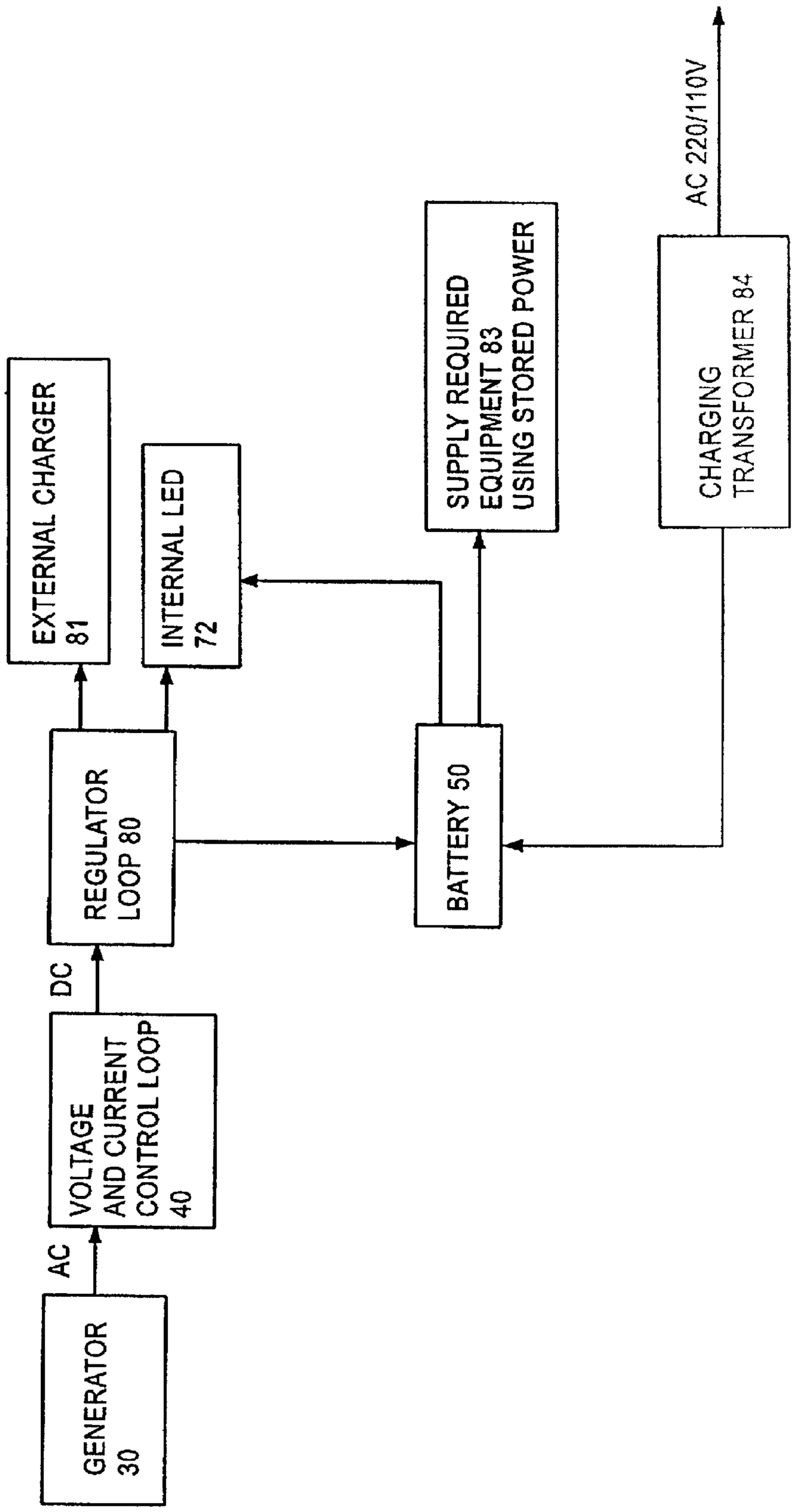


FIG. 4



Amended
FIG. 5

FIG. 6 Amended

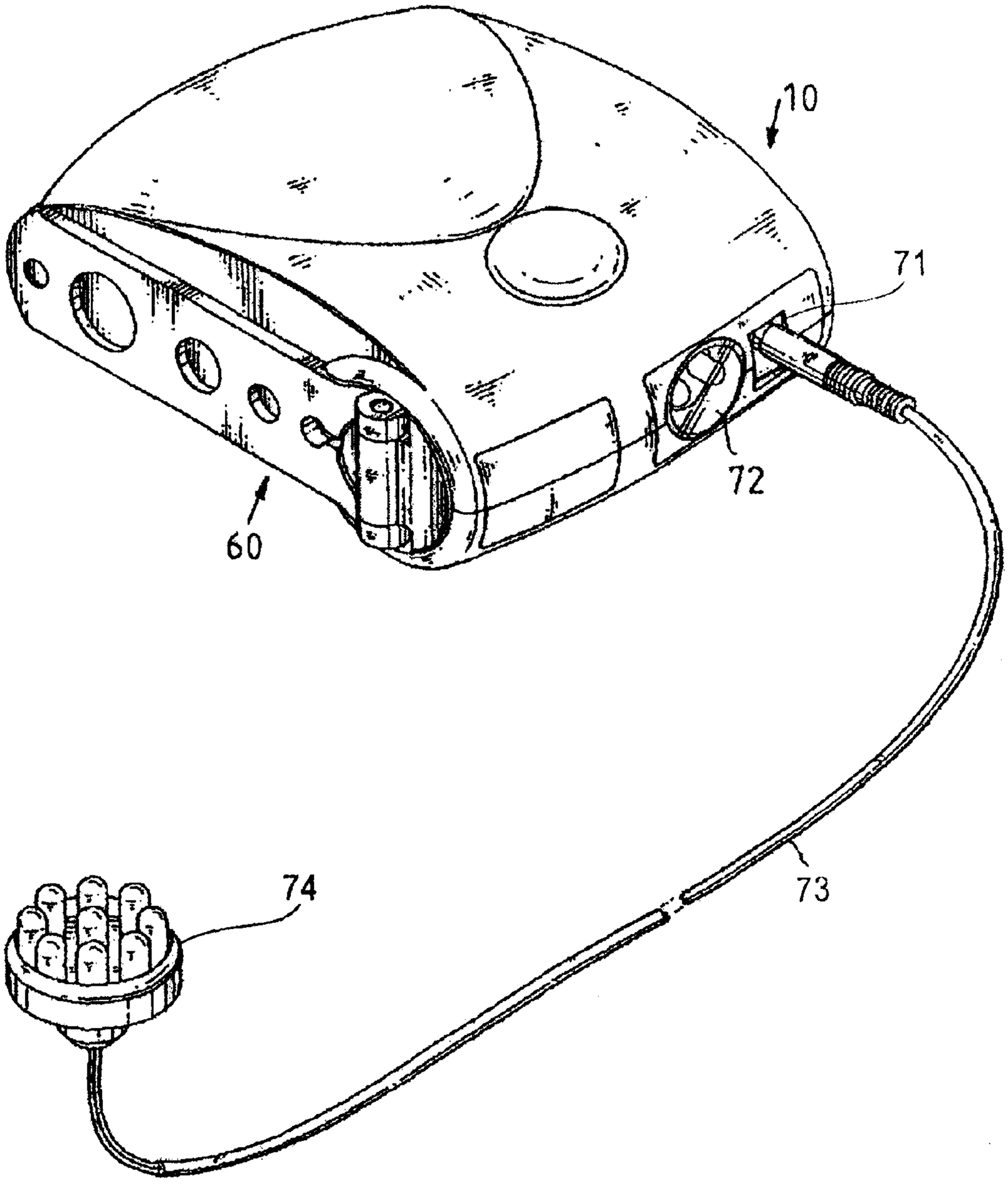


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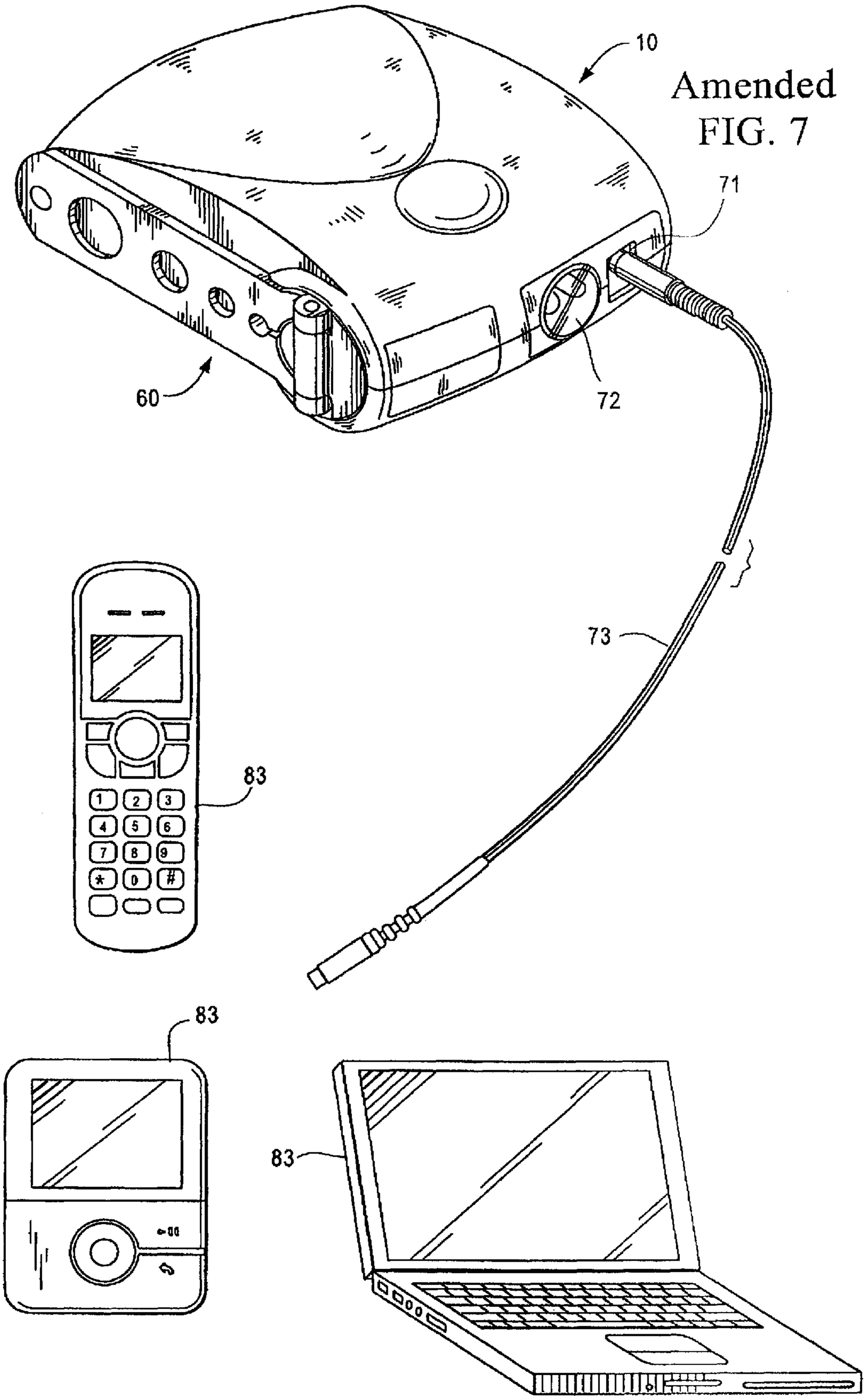
FIG. 7



MULTI-FUNCTIONAL CHARGER WITH POWER GENERATING AND ILLUMINATION FUNCTIONS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

FIELD OF THE INVENTION

The present invention relates to power **[**charger**]** *chargers*, and particularly to multi-functional **[**charger**]** *chargers* with power generating and illumination functions.

BACKGROUND OF THE INVENTION

In the current modern life, electric devices are used frequently, almost everybody needs to use electric devices in the daily life. Such devices are for example notebook computers, mobile phones, portable audio recorders, etc. However, in general, these devices are portable and thus are necessary to be charged by a charger. In general, the charger is lack of a generator. Thereby, the charger must be connected to a power source for receiving power and then charges the power to these devices. Thereby, the prior art charger has no illuminating lamp and thus it is inconveniently for being used in the dark.

SUMMARY OF THE INVENTION

Accordingly, the primary object of the present invention is to provide a multi-functional charger with power generating and illumination functions. The charger comprises a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod *or hand crank*. When the **[**movable rod rotates**]** *hand crank is rotated*, the generator will operate by the driving of the gear set so as to generate a current. The current is suppressed, rectified and regulated by the voltage and current control loop. It can be **[**determined to be**]** stored in the battery or outputted through **[**a plug**]** *an output portion* (*e.g., a jack*) by the switching of the switch. The power stored in the battery can be supplied to the LED lamp or **[**to**]** *it can* be outputted. When the power is outputted, **[**a plug serves to**]** *the output portion* (*e.g., a jack*) *can* be connected to an electric device to be charged. Or to achieve the requirement of illumination, it **[**is**]** *can be* connected to an external bulb set. Thereby, the present invention can be used in various applications.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended **[**drawing**]** *drawings*.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an assembled perspective view of the present invention.

FIG. **2** is an exploded perspective view of the present invention.

FIG. **3** is a cross sectional view of the present invention.

FIG. **4** is a schematic view showing the storage of power according to the present invention.

FIG. **5** is a block diagram showing the function and process of the present invention.

FIG. **6** is a schematic view showing one embodiment about the illumination of the present invention.

FIG. **7** is a schematic view showing power output way in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1** and **3**, the multi-functional charger with power generating and illumination functions of the present invention is illustrated. The multi-functional charger with power generating and illumination functions includes a device body **10**, a gear set **20**, a generator **30**, a voltage and current control loop **40**, a battery **50**, and a movable rod **60**.

The device body **10** is formed by an upper casing **11** and a lower casing **12**. The inner edge thereof is formed with a first receiving space **13**, a second receiving space **14**, and a third receiving apparatus **15** for receiving the gear set **20**, the generator **30**, the voltage and current control loop **40** and the battery **50**.

The gear set **20** includes a first gear **21**, a second gear **22**, a third gear **23**, and a fourth gear **24**. Two pivot rods **25**, **25'** pass through the gears **21**, **22**, **23** and **24** to be pivoted to a front end of the first receiving space **13** of the device body **10**. One pivot rod **25** passes through the first and second gears, **21** and **22**, and another pivot rod **25'** passes through the third and fourth gears **23** and **24**. The gears **21**, **22**, **23** and **24** are alternatively arranged so as to form a driving system. One outer lateral side of the gear set **20** is pivoted to the movable rod **60**. By rotating the movable rod **60**, the gear set **20** is driven to rotate.

The generator **30** is a smaller type generator which is installed at a rear side of the second receiving space **14** of the device body **10**. One side of the generator **30** has a driving shaft **31**. A driving gear **32** is engaged to the driving shaft **31**. The driving gear **32** is engaged to one end of the gear set **20**. Thereby, the generator **30** can be driven to generate power by the gear set **20**.

The voltage and current control loop **40** is an IC circuit board which convert the AC current from the generator **30** to DC current. The voltage and current control loop **40**, an output portion **71** and an LED light are placed at a front end of the second receiving space **14** of the device body **10**. The voltage and current control loop **40** is electrically connected to the generator **30**. Thereby, the voltage and current control loop **40** is also connected to the battery **50**, output portion **71**, and LED light **72**. Other than storing the power generating by the generator **30**, power generated by the generator **30** can be outputted to outer elements, or to the LED light **72**. A control switch **41** in the voltage and current control loop **40** is used to control the power storage or output.

The battery **50** is received in the second receiving space **14** of the device body **10**. The battery **50** is a component for storing power from the generator **30**.

The movable rod *or hand crank* **60** is installed at one lateral side of the device body **10**. The movable rod **60** is formed by a *rod* body **61**, a *coupler* pivot rod **62**, and a handle **63**. The *rod* body **61** has **[**an**]** *a* Y shape. One end of the *rod* body **61** is pivotally connected to the device body **10** by a pin **64**. The pivot rod **62** is coupled at one lateral side of the device body **10**. The pivot rod **62** can rotate through 180 degrees. The handle **63** is another side of the *rod* body **61** can be received in the third receiving space **15** of the *device* body **10** so as to present **[**a beautiful outlook**]** *an attractive appearance* and to be carried conveniently (referring to FIG. **4**). It should **[**by**]** *be* noted that when the pivot rod **62** is firmly secured to the device body **10**, it is connected to one end of the gear set **20** so that the movable rod **60** can drive the gear set **20** to rotate.

Referring to FIG. **5**, a block diagram for illustrating *alternative embodiments of* the present invention **[**is**]** *are* illus-

trated. When the movable rod **60** rotates, the generator **30** will operate by **[**the**]** driving **[**of the**]** gear set **20** so as to **[**generator**]** *generate* a current. The current is suppressed, rectified and regulated by the voltage and current control loop **40**. Then the current flow*s* to a regulator loop **80**. Then the power can be outputted to an external charger **81** or internal LEDs **[82]** *72* or to a charger*/battery* **50** for further supply to other required equipment **83** **[**or to a**]**. *A* charging transformer **84** *may be used to charge battery 50.*

As illustrated in FIGS. **6** and **7**, in another embodiment, the **[**power of the current**]** *energy from generator 30* can be stored in the battery **50** or outputted through **[**a plug **73]** *an output portion 71 (e.g., a jack, see FIG. 1)* by switching the switch **41**. The power stored in the battery **50** can be supplied to the LED lamp **72** or **[**to be**]** *it can be* outputted. When the power is outputted, **[**a plug **73** serves to**]** *output portion 71 (e.g., jack 71) can* be connected *via cable 73* to an electric device *83* to be charged**[**. Moreover, to achieve the requirement of illumination, it is connected to**]**, *such as* an external bulb set **74** (*see FIG. 6*), *or to a handset, a portable audio device or a notebook 83* (*see FIG. 7*). Thereby, the present invention can be used in various **[**application**]** *applications*.

The present invention is thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. A multi-functional charger with power generating and illumination functions comprising a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod; wherein

the device body is formed by an upper casing and a lower casing; an inner edge of the device body is formed with a plurality of receiving spaces for receiving the gear set, the generator, the voltage and current control loop and the battery;

the gear set includes a first gear, a second gear, a third gear, and a fourth gear; two pivotal rods pass through the gears to be pivoted to one receiving space of the device body; each **[**first pivot**]** *pivotal* rod passes through **[**the**]** two different gears; the four gears are alternatively arranged so as to form a driving system; one outer lateral side of the gear set is pivoted to the movable rod;

the generator is installed in the device body and one side of the gear set opposite to the side of the gear set *which* is installed with the movable rod; another end of the generator has a driving shaft; a driving gear is engaged to the driving shaft; the driving gear is engaged to one end of the gear set; thereby, the generator is driven to generate power by the gear set; and

the voltage and current control loop is an **[**IC**]** *integrated* circuit board which convert AC current from the generator to DC current; one end of the voltage and current control loop is connected to a battery for storing power from the generator and another end of the voltage and current control loop is connected to an output portion for outputting the power *to an electrical device*, or is connected to an LED for illumination, *wherein the voltage and current control loop is capable of charging the electrical device or the LED even if the battery is not charged.*

2. The multi-functional charger with power generating and illumination functions **[**as claimed in**]** *of* claim **1**, wherein **[**a**]** *the* movable rod is**[**,**]** formed by a *rod* body, a **[**second**]** *coupler* pivot rod **[**is**]** *coupled to the rod body* and a handle; one end of the *rod* body is pivotally connected to the device body by a pin and *is* capable of rotating through 180 degrees; and the handle at another **[**side**]** *end* of the *rod* body is received in the device body.

3. The multi-functional charger with power generating and illumination functions **[**as claimed in**]** *of* claim **1**, further comprising a control switch which is connected to the voltage and current control loop for **[**controlling**]** *directing* the current generated by the generator to be stored in the battery or to be outputted *to an output portion*.

4. The multi-functional charger with power generating and illumination functions **[**as claimed in**]** *of* claim **1**, wherein the output portion is *operatively* connected to an **[**electric**]** *electrical* device through a **[**plug**]** *jack* so as to **[**charge**]** *provide* power to the **[**electric**]** *electrical* device.

5. The multi-functional charger with power generating and illumination functions **[**as claimed in**]** *of* claim **4**, wherein the **[**electric**]** *electrical* device is selected from one of a group containing *a* handset, a portable audio device, and a notebook.

6. The multi-functional charger with power generating and illumination functions of claim 1, wherein the output portion comprises an electrical device powered directly from the battery.

7. The multi-functional charger with power generating and illumination functions of claim 1, wherein stored power is provided to an LED powered by the battery.

8. The multi-functional charger with power generating and illumination functions of claim 1, wherein the electrical device comprises a light bulb.

9. A charger with power generating and illumination functions, comprising:

a device body housing a gear set, a generator, a voltage and current control loop, and a battery;

the gear set being connected to a hand crank and including a plurality of gears disposed in the device body, the gears being arranged so as to form a driving system;

the generator having a driving shaft engaged to a driving gear, and the driving gear being driven by the driving system to generate power; and

the voltage and current control loop comprising an electrical circuit which converts AC current from the generator to DC current, wherein the voltage and current control loop provides regulation for charging the battery and provides power for powering an electrical device, and wherein the control loop is capable of powering the electrical device even if the battery is not charged.

10. The charger with power generating and illumination functions of claim 9, wherein the electrical device comprises a LED.

11. The charger with power generating and illumination functions of claim 9, wherein the hand crank comprises a rod body and a handle, one end of the rod body is pivotally connected to the device body and capable of rotation, and the handle is received within a recess in the device body.

12. The charger with power generating and illumination functions of claim 9, further comprising a control circuit in electrical communication with the voltage and current control loop for directing the current generated by the generator to the battery, to an LED, or to an external electrical device, or for directing the current generated by the generator from the battery to the LED or to the external electrical device.

13. The charger with power generating and illumination functions of claim 12, wherein the current transmitted to the battery is then transmitted to an external device.

14. The charger with power generating and illumination functions of claim 12, wherein the electrical device is selected from one of a group including a handset, a portable audio device, or a notebook.

15. The charger with power generating and illumination functions of claim 9, wherein the electrical circuit comprises an integrated circuit.

16. A charger with power generating and illumination functions, comprising:

a device body housing a gear set, a generator, a voltage and current control loop, a battery, and a crank shaft;

the gear set comprising a plurality of gears disposed in the device body, and the gears being arranged so as to form a driving system capable of being driven by the crank shaft and in mechanical communication with a generator; and

the voltage and current control loop comprising an electrical circuit which converts AC current from the generator to DC current, wherein the voltage and current control loop: rectifies current and regulates voltage; electrically communicates with the battery for storing power from the generator; and electrically communicates with a LED for providing illumination, and wherein the control loop is capable of powering an electrical device based on power from the battery, or based on power provided solely from the crank shaft, the generator and the voltage and current control loop.

17. A charger with power generating and illumination functions, comprising:

a device body housing a gear set, a generator, an electrical circuit, and a battery;

the gear set comprising a plurality of gears disposed in the device body, the gears being arranged so as to form a driving system in mechanical communication with a generator;

the electrical circuit being operatively connected to the battery for storing power from the generator, and being operatively connected to a LED for providing illumination; and

a hand crank operatively connected to the driving system to communicate human power to the driving system;

wherein the control loop is capable of powering an electrical device or the LED even if the battery is not charged.

18. The charger with power generating and illumination functions of claim 17, wherein the hand crank is configured to fold substantially flat against the device body when not in use.

19. The charger with power generating and illumination functions of claim 17, wherein the electrical circuit is operatively connected to an external device to enable charging of the electrical device.

20. The charger with power generating and illumination functions of claim 19, wherein the external device is selected from one of a group containing: a handset; a portable audio device; or a notebook.

21. A multi-functional charger with power generating and illumination functions comprising:

a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod, wherein the device body is formed by an upper casing and a lower casing, and the gear set includes a plurality of gears arranged to form a driving system;

an inner edge of the device body being formed with a plurality of receiving spaces for receiving the gear set, the generator, the voltage and current control loop and the battery;

a generator having a driving shaft and being installed in the device body, the gear set being connected to the generator and being capable of being driven by a hand crank to provide power from the generator;

a driving gear engaged to the driving shaft and to the gear set; and

the voltage and current control loop comprising an electrical circuit which converts AC current from the generator to DC current, wherein the voltage and current control loop is connected to a battery for storing power from the generator, and the control loop is also connected either to an output portion for outputting the power to an external electrical device, or to an LED for illumination, and wherein the control loop can power the external electrical device or the LED even if the battery is not charged.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

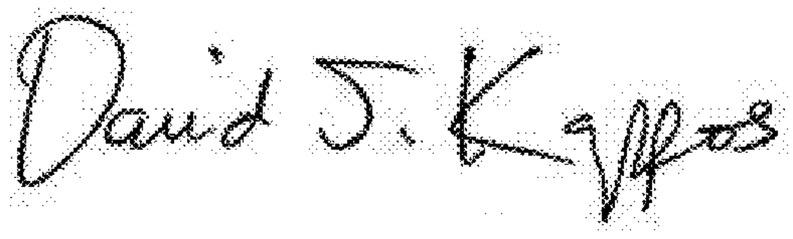
PATENT NO. : RE41,060 E
APPLICATION NO. : 11/349522
DATED : December 29, 2009
INVENTOR(S) : Yung-Chia Yu

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Assignee incorrectly identified as Daniel Tai. Please amend to:

Assignee: Original Creations, Inc., Naperville, IL

Signed and Sealed this
Fifth Day of April, 2011



David J. Kappos
Director of the United States Patent and Trademark Office

US00RE41060C1

(12) EX PARTE REEXAMINATION CERTIFICATE (8826th)

United States Patent
Yu

(10) Number: US RE41,060 C1
(45) Certificate Issued: Jan. 31, 2012

(54) **MULTI-FUNCTIONAL CHARGER WITH POWER GENERATING AND ILLUMINATION FUNCTIONS**

(75) Inventor: **Yung-Chia Yu**, Taipei (TW)

(73) Assignee: **Original Creations, Inc.**, Naperville, IL (US)

Reexamination Request:
No. 90/011,613, Apr. 1, 2011

Reexamination Certificate for:

Patent No.:	**Re. 41,060**
Issued:	**Dec. 29, 2009**
Appl. No.:	**11/349,522**
Filed:	**Feb. 8, 2006**

Certificate of Correction issued Apr. 5, 2011.

Related U.S. Patent Documents

Reissue of:

(64)	Patent No.:	**6,690,141**
	Issued:	**Feb. 10, 2004**
	Appl. No.:	**10/233,828**
	Filed:	**Sep. 3, 2002**

(51) **Int. Cl.**

H01M 10/46	(2006.01)
H02J 7/32	(2006.01)
H02K 7/18	(2006.01)

(52) **U.S. Cl.** **320/107**

(58) **Field of Classification Search** 320/115
See application file for complete search history.

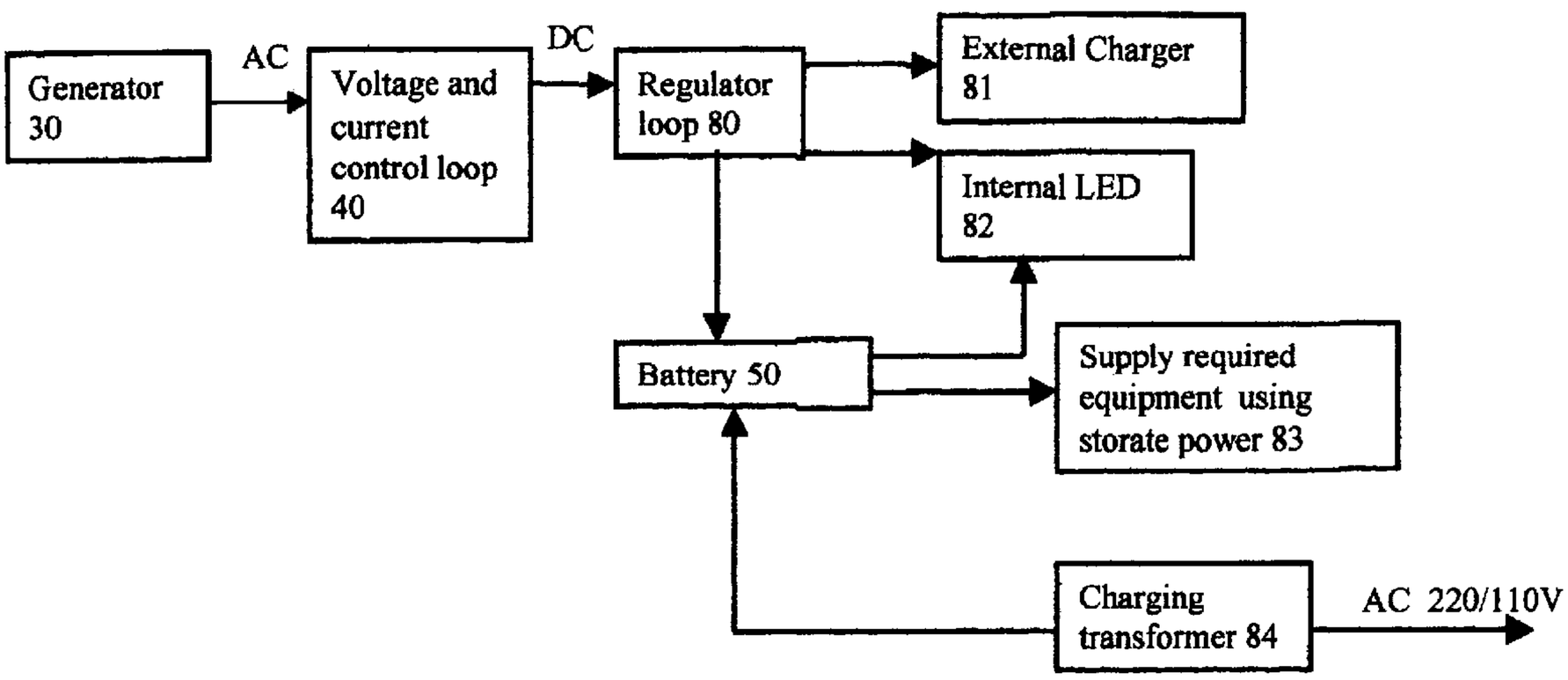
(56) **References Cited**

To view the complete listing of prior art documents cited during the proceeding for Reexamination Control Number 90/011,613, please refer to the USPTO's public Patent Application Information Retrieval (PAIR) system under the Display References tab.

Primary Examiner—Margaret Rubin

(57) **ABSTRACT**

A multi-functional charger with power generating and illumination functions comprises a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod. When the movable rod rotates, the generator will operate by the driving of the gear set so as to generate a current. The current is suppressed, rectified and regulated by the voltage and current control loop. It can be determined to be stored in the battery or outputted through a plug by the switching of the switch. The power stored in the battery can be supplied to the LED lamp or to be outputted. When the power is outputted, a plug serves to be connected to an electric device to be charged. To achieve the requirement of illumination, the generator is connected to an external bulb set. Thereby, the charger can be used in various applications.



EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the original patent but was deleted by the reissue patent; matter printed in italics was added by the reissue patent. Matter enclosed in heavy double brackets [[ ]] appeared in the reissue patent but is deleted by this reexamination certificate; matter printed in boldface is added by this reexamination certificate.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims **9-15** is confirmed.

Claims **1**, **16**, **17** and **21** are determined to be patentable as amended.

Claims **2-8** and **18-20**, dependent on an amended claim, are determined to be patentable.

1. A multi-functional charger with power generating and illumination functions comprising a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod; wherein

the device body is formed by an upper casing and a lower casing; an inner edge of the device body is formed with a plurality of receiving spaces for receiving the gear set, the generator, the voltage and current control loop and the battery;

the gear set includes a first gear, a second gear, a third gear, and a fourth gear; two pivotal rods pass through the gears to be pivoted to one receiving space of the device body; each **[**first pivot**]** *pivotal* rod passes through **[**the**]** two different gears; the four gears are alternatively arranged so as to form a driving system; one outer lateral side of the gear set is pivoted to the movable rod;

the generator is installed in the device body and one side of the gear set opposite to the side of the gear set *which* is installed with the movable rod; another end of the generator has a driving shaft; a driving gear is engaged to the driving shaft; the driving gear is engaged to one end of the gear set; thereby, the generator is driven to generate power by the gear set; and

the voltage and current control loop is an **[**IC**]** *integrated* circuit board which convert AC current from the generator to DC current; one end of the voltage and current control loop is connected to a battery for storing power from the generator and another end of the voltage and current control loop is connected to an output portion for outputting the power *to an electrical device*, or is connected to an LED for illumination, *wherein the voltage and current control loop* provides regulation for charging the battery and *is capable of charging the electrical device or the LED even if the battery is not charged.*

16. A charger with power generating and illumination functions, comprising:

a device body housing a gear set, a generator, a voltage and current control loop, a battery, and a crank shaft;

the gear set comprising a plurality of gears disposed in the device body, and the gears being arranged so as to form a driving system **in mechanical** *capable of being driven by the crank shaft and in mechanical communication with a generator; and*

the voltage and current control loop comprising an electrical circuit which converts AC current from the generator to DC current, wherein the voltage and current control loop: rectifies current and **[[***regulates voltage***]]** **provides regulation for charging the battery***; electrically communicates with the battery for storing power from the generator; and electrically communicates with a LED for providing illumination, and wherein the control loop is capable of powering an electrical device based on power from the battery or based on power provided solely from the crank shaft, the generator and the voltage and current control loop.*

17. A charger with power generating and illumination functions, comprising:

a device body housing a gear set, a generator, an electrical circuit **including a voltage and current control loop***, and a battery;*

the gear set comprising a plurality of gears disposed in the device body, the gears being arranged so as to form a driving system in mechanical communication with a generator;

the electrical circuit being operatively connected to the battery for storing power from the generator, and being operatively connected to a LED for providing illumination; and

a hand crank operatively connected to the driving system to communicate human power to the driving system;

wherein the **voltage and current** *control loop* **provides regulation for charging the battery and** *is capable of powering an electrical device or the LED even if the battery is not charged.*

21. A multi-functional charger with power generating and illumination functions comprising:

a device body, a gear set, a generator, a voltage and current control loop, a battery, and a movable rod, wherein the device body is formed by an upper casing and a lower casing, and the gear set includes a plurality of gears arranged to form a driving system;

an inner edge of the device body being formed with a plurality of receiving spaces for receiving the gear set, the generator, the voltage and current control loop and the battery;

a generator having a driving shaft and being installed in the device body, the gear set being connected to the generator and being capable of being driven by a hand crank to provide power from the generator;

a driving gear engaged to the driving shaft and to the gear set; and

the voltage and current control loop comprising an electrical circuit which converts AC current from the generator to DC current, wherein the voltage and current control loop is connected to a battery for storing power from the generator, and the **voltage and current** *control loop is also connected either to an output portion for outputting the power to an external electrical device, or to an LED for illumination, and wherein the* **voltage and current** *control loop* **provides regulation for charging the battery and** *can power the external electrical device or the LED even if the battery is not charged.*

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