(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 953 108 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.12.2015 Bulletin 2015/50

(51) Int Cl.:
G08C 17/02 *(2006.01)* ***G08C 23/04*** *(2006.01)*

(21) Application number: **15170859.1**

(22) Date of filing: **05.06.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

(30) Priority: **06.06.2014 IT MI20141039**

(71) Applicant: **Bticino S.p.A.**
21100 Varese (IT)

(72) Inventor: **Santini, Ernesto**
28060 Sozzago (NO) (IT)

(74) Representative: **Biallo, Dario**
Barzanò & Zanardo Milano S.p.A.
Via Borgonuovo, 10
20121 Milano (IT)

(54) ELECTRICAL SUPPLY SYSTEM FOR ELECTRONIC DEVICES

(57) The present invention refers to an electrical power supply system for electronic devices, particularly but not exclusively usable in the field of domotics and, in particular, in the field of an electrical household system in which the electrical power supply system (10) comprises: at least one electronic device (12) comprising a box-shaped body (13) containing inside it at least one electrical storage device (14) and an electronic apparatus (15) that is powered by the electrical storage device (14), the electronic device (12) being configured for transmitting in a wireless manner control and/or information signals and for receiving in a wireless manner at least one power supply signal and for at least partially compensating for the discharge of the at least one electrical storage device (14) due to the leakage currents and/or medium operating currents; a power supply device (11) configured for being connected to an electrical power supply line and for transmitting in a wireless manner a power supply signal to the at least one electronic device (12) when the power supply device (11) is connected to the electrical power supply line, said power signal having energy such as to at least partially compensate for the discharge of the at least one electrical storage device (14) due to the leakage currents and/or medium operating currents, the electrical power supply system being characterised in that the power supply device (11) is configured for transmitting the power signal at the infrared frequencies.

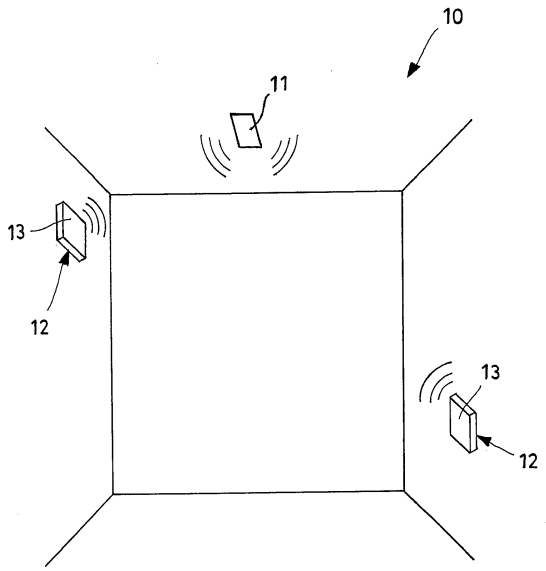


Fig.1

EP 2 953 108 A1

Description

[0001] The present invention refers to an electrical power supply system for electronic devices that is particularly, but not exclusively, usable in the field of domotics and, in particular, in the field of an electrical household system.

[0002] Various types of sensors are currently known, for example temperature sensors and movement sensors, which are capable of wirelessly transmitting the detections carried out to an electronic control unit.

[0003] Control or remote control apparatuses are also known, for example switches, which are capable of activating, by wirelessly transmitting a control signal, a light or more generally an electric/electronic apparatus.

[0004] The control or remote control apparatuses and the sensors mentioned above are associable with power supply batteries and can be installed inside box-shaped bodies that can be applied to the walls of a room, thus making those that in the following description are indicated, for the sake of simplicity, as electronic devices.

[0005] In such a case, the electronic devices can be positioned in any point of the room where they are installed without the need of connecting them directly to the power supply line of the electrical system of the room itself.

[0006] The installation of these devices inside a room can be, therefore, carried out at any moment and not necessarily simultaneously to restructuring or maintenance operations or extension operations of the electrical system.

[0007] However, such electronic devices have some drawbacks.

[0008] One first drawback lies in the fact that the power supply batteries of such devices, during the normal use, naturally become discharged in a continuous and progressive manner and, thus, require to be replaced once the charge has been insufficient for power supplying the devices. In particular, the continuous discharging of the power supply batteries is not only linked to the operation of the electronic devices associated with them, but also to loss or leakage currents.

[0009] A second drawback lies in the fact that the box-shaped bodies of the electronic devices have necessarily to be at least partially openable, since they must allow the batteries to be replaced.

[0010] This causes greater complexity in making them and less strength, as well as a less seal against external agents that are harmful for the electronic circuits, like for example water and dust.

[0011] The purpose of the present invention is that of avoiding the aforementioned drawbacks and, in particular, that of conceiving an electrical power supply system for electronic devices that is capable of ensuring a greater duration of the operation of such devices with respect to the prior art without requiring maintenance operations.

[0012] Another purpose of the present invention is that of providing an electrical power supply system for electronic devices that allows using stout devices simple to be made and that offer greater seal against harmful external agents than in known devices.

[0013] These and other purposes according to the present invention are achieved by making an electrical power supply system for electronic devices as outlined in claim 1.

[0014] Further characteristics of the electrical power supply system for electronic devices are object of the dependent claims.

[0015] The characteristics and the advantages of an electrical power supply system for electronic devices according to the present invention shall become clearer from the following description, given as an example and not for limiting purposes, with reference to the attached schematic drawings, in which:

- figure 1 is a schematic view of an embodiment of an electrical power supply system for electronic devices according to the present invention installed inside a room;
- figure 2 is a schematic block view of the electrical power supply system for electronic devices of figure 1. With reference to the figures, an electrical power supply system for electronic devices is shown, wholly indicated with reference numeral 10.

[0016] Such a power supply system 10 comprises a power supply device 11 that can be connected to an electrical power supply line and at least one electronic device 12. The power supply device 11 is also configured for transmitting, in a wireless manner, a power supply signal to the at least one electronic device 12 when the power supply device 11 itself is connected to the electrical power supply line.

[0017] In particular, the power supply device 11 is preferably configured for transmitting in a wireless manner power supply signals at the infrared frequencies or IR or at the radio frequencies or RF.

[0018] The at least one electronic device 12 comprises a box-shaped body 13 containing inside it at least one electrical storage device 14 and an electronic apparatus 15 that is supplied by the aforementioned storage device 14.

[0019] The electrical storage device 14 can be a battery or a pile or a super-capacitor and so on.

[0020] The electronic apparatus 15 can be, for example, a sensor of various kinds like, for example, a temperature sensor, a humidity sensor, a movement sensor and so on, or it can be a control or remote control apparatus. The electronic apparatus 15 is, thus, according to the cases capable of generating a control signal for an electrical/electronic apparatus and/or an information signal.

[0021] The at least one electronic device 12 is advantageously configured for transmitting, in a wireless manner, the control and/or information signals that are generated by the electronic apparatus 15; in particular, in the

case in which the electronic apparatus 15 is a sensor, the electronic device 12 sends a signal containing the information concerning the detection that has been carried out for example to an electronic control unit or to a mobile terminal like, for example, a smart mobile phone or a smartphone.

[0022] In the case in which the electronic apparatus 15 is a control or remote control apparatus, the electronic device 12 sends a control signal so as to activate the power supply a light source or more in general an electric/electronic apparatus.

[0023] In any case the electronic device 12 is provided with first wireless transceiver means 16 comprising at least one antenna, which are connected to the electronic apparatus 15 and which are adapted to transmit the aforementioned control signals and/or information at frequencies belonging to a predetermined range of frequencies.

[0024] In particular, the electronic device 12 is preferably configured for transmitting, in a wireless manner, control and/or information signals at the infrared frequencies or IR or at radio frequencies or RF.

[0025] The electronic device 12 is, moreover, advantageously configured for wirelessly receiving at least one power supply signal and for at least partially compensating for the discharge of the at least one electrical storage device 14 due to leakage currents and/or medium operating currents.

[0026] In particular, the electronic device 12 comprises second wireless transceiver means 17 that are adapted to receive the aforementioned power supply signal. It is worth underlining that the second wireless transceiver means 17 are capable of receiving any signal that propagates at the same frequencies as the power supply signal in the room where the electronic device 12 is installed. In the case in which the power supply signal is a signal at the radio frequencies, the second wireless transceiver means 17 comprise at least one antenna that is capable of detecting any signal at the radio frequencies like, for example, the signal emitted by a Wi-Fi router/modem.

[0027] In the case in which the power signal is a signal at the infrared frequencies, the second wireless transceiver means 17 comprise at least an infrared photo cell.

[0028] The electronic device 12 comprises, moreover, compensation circuits 18 that are connected on one side to the aforementioned second transceiver means in a wireless manner 17 and on the other side to the electronic apparatus 15 and/or to the at least one electrical storage device 14.

[0029] In particular, in the case in which such an electrical storage device 14 is not of the rechargeable type, the compensation circuits 18 provide the electronic apparatus 15 with a current for compensating for the leakage and/or medium operating currents.

[0030] Indeed, the printed electronic circuit and the electronic components that are connected to the storage device normally have a non-infinite resistance, causing a parasitic current that, in a time period that may or may not be long, can lead to the discharge of the electrical storage device. The compensation of such a current through the invention allows, therefore, increasing the duration of the electric charge even for storage devices of the non-rechargeable type.

[0031] In one preferred embodiment, the at least one electrical storage device 14 is of the rechargeable type; in such a case the compensation circuits 18 comprise circuits for recharging such electrical storage device 14. In such a way the power signal provided by the power supply device 11 can not only be used for compensating for the leakage currents, but also for recharging the electrical storage device 14. Such a power supply signal is preferably of the pulse train type; in particular, the time interval that passes between one pulse and the next one depends on the energy necessary for compensating for the leakage currents and/or for recharging the electrical storage device 14. The average energy that can be carried by the power supply signals is however limited by the electromagnetic compatibility standards that prevent the presence in the environment of electrical fields having an intensity greater than a predetermined threshold.

[0032] Therefore, the frequency of the pulse train must be determined in such a way that the energy carried by the power supply signal is sufficient for compensating for the leakage currents and/or for recharging the electrical storage device 14.

[0033] Preferably, the box-shaped body 13 is seal closed.

[0034] The operation of the electrical power supply system for electronic devices according to the present invention is as follows.

[0035] For the sake of simplicity, let us consider a room where there is an electrical system comprising an electrical power supply line, for example a 230 V line. The electronic devices 12 are applied to the walls of the room without the need of connecting them to the electrical line of the system, since the electronic apparatuses 15 are supplied by the at least one electrical storage device 14.

[0036] The power supply device 11 is applied in the room in any points where the electrical line of the system is accessible. For example, such a power supply device 11 can be provided with an electrical plug and in such a case it can be applied to an electrical plug of the room, or rather installed in a flush box. Alternatively, the power supply device 11 can be installed at a light source on the ceiling of the room so that it can be at sight with respect to the electronic devices 12.

[0037] Once it has been connected to the electrical line, the power supply device 11 sends, in a wireless manner, a power supply signal that is at least partially capable of compensating for the leakage currents and/or medium operating currents of the electronic devices 12 present in the room. In such a way, the life of the electrical storage device 14 increases.

[0038] This advantageous effect is even greater if the electrical storage device 14 is of the rechargeable type and the compensation circuit comprises a circuit for re-

charging the electrical storage device itself 14. In such a case, the power supply signal that is provided in a wireless manner is capable of at least partially compensating also for the discharge of the electrical storage device due to the operation of the electronic apparatus 15.

[0039] Furthermore, let us consider that the power supply device 11 can be, preferably, any light source, for example a light bulb that, when turned on, not only emits visible light but also radiations at the infrared frequencies. In such a case, the electrical storage device 14 is recharged in an extremely simple and comfortable manner for the user thanks to the energy of the infrared radiations emitted by the light source. Indeed, the storage device 14 is recharged each time the light is turned on in the room where the electronic device 12 is installed. Moreover, it is not necessary to provide complex circuits for modulating the power supply signal at the infrared frequencies.

[0040] In one particular embodiment of the present invention, then, the electronic device 12 can be advantageously configured so as to send, when the storage device 14 is at least partially discharged, a signal for turning on the light source so as to recharge the electrical storage device 14.

[0041] The characteristics of the electrical power supply system for electronic devices object of the present invention are clear in the present description, as well as the relative advantages are clear.

[0042] Indeed, if the average life of an electrical storage device used in the known electronic devices varies from around 3 to around 5 years, the average life of an electrical storage device of the same type used in a device of the system object of the present invention can also vary from 15 to 20 years.

[0043] The electronic sealed devices, moreover, can also be applied in very humid or dusty environments, such as construction sites.

[0044] It is finally clear that the electrical power supply system for electronic devices thus conceived is subject to numerous modifications and variants, all covered by the invention; moreover, all the details can be replaced by technically equivalent elements. In practice the materials used, as well as the dimensions, can be any according to the technical requirements.

Claims

1. Electrical power supply system (10) for electronic devices comprising:

- at least one electronic device (12) comprising a box-shaped body (13) containing inside it at least one electrical storage device (14) and an electronic apparatus (15) powered by said electrical storage device (14), said electronic device (12) being configured for transmitting in a wireless manner control and/or information signals and for receiving in a wireless manner at least one power supply signal and for at least partially compensating for the discharge of said at least one electrical storage device (14) due to the leakage currents and/or medium operating currents;
- a power supply device (11) configured for being connected to an electrical power supply line and for transmitting in a wireless manner a power supply signal to said at least one electronic device (12) when said power supply device (11) is connected to said electrical power supply line, said power signal having energy such as to at least partially compensate for the discharge of said at least one electrical storage device (14) due to the leakage currents and/or medium operating currents.

characterized in that said power supply device (11) is configured for transmitting said power supply signal at the infrared frequencies.

2. Electrical power supply system (10) according to claim 1 wherein said at least one electronic device (12) further comprises second wireless transceiver means (17) adapted to receive said power supply signal and compensation circuits (18) on one side connected to said second wireless transceiver means (17) and on the other side to said electronic apparatus (15) and/or to said at least one electrical storage device (14).

3. Electrical power supply system (10) according to claim 2 wherein said at least one electrical storage device (14) is of the rechargeable type and said compensation circuits (18) comprise circuits for recharging said at least one electrical storage device (14) through said power signal received.

4. Electrical power supply system (10) according to any of the preceding claims wherein said electronic device (12) is configured for transmitting in a wireless manner control and/or information signals at the infrared frequencies.

5. Electrical power supply system (10) according to any claims 1 to 3 wherein said electronic device (12) is configured for transmitting in a wireless manner control and/or information signals at the radio frequencies.

6. Electrical power supply system according to any of the preceding claims wherein said power supply device (11) is a light source that, when turned on, not only emits visible light but also radiations at the infrared frequencies and said electronic device (12) is configured for sending a signal, when said storage device (14) is at least partially discharged, that turns on the light source so as to recharge said electrical

storage device (14).

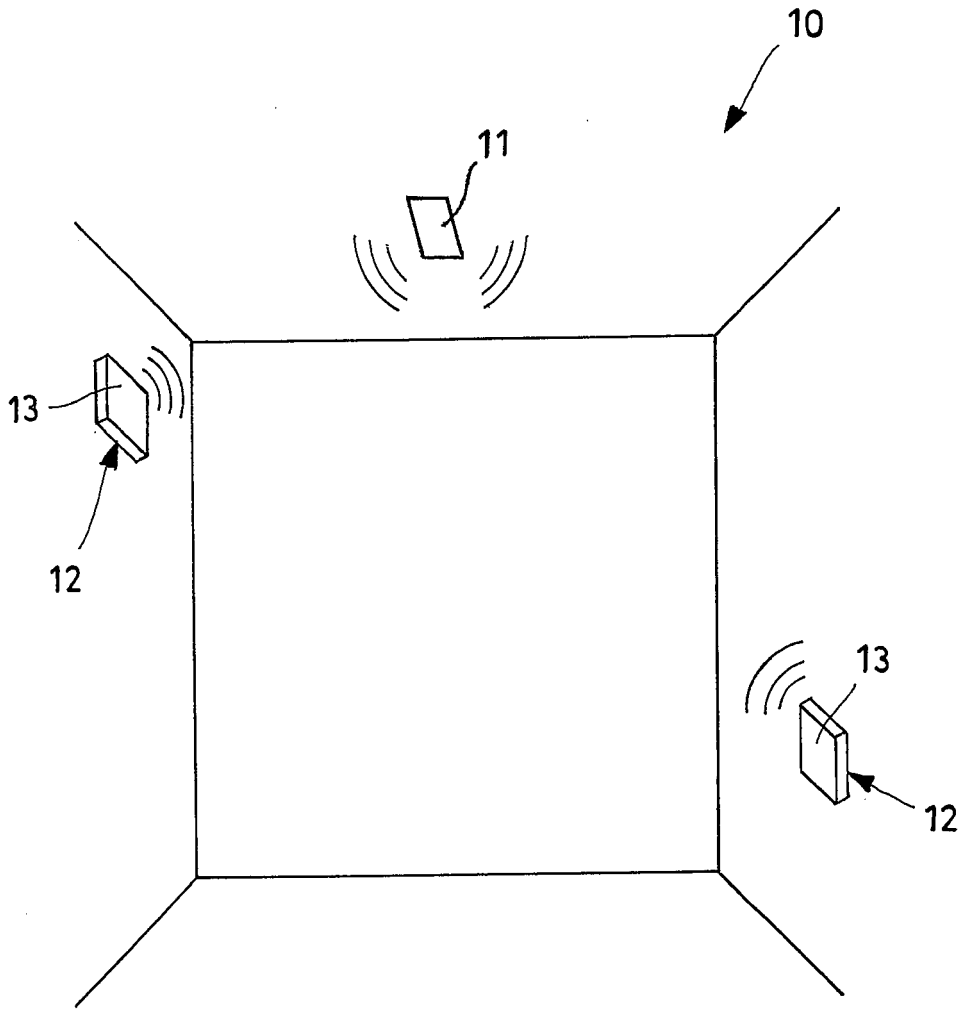


Fig.1

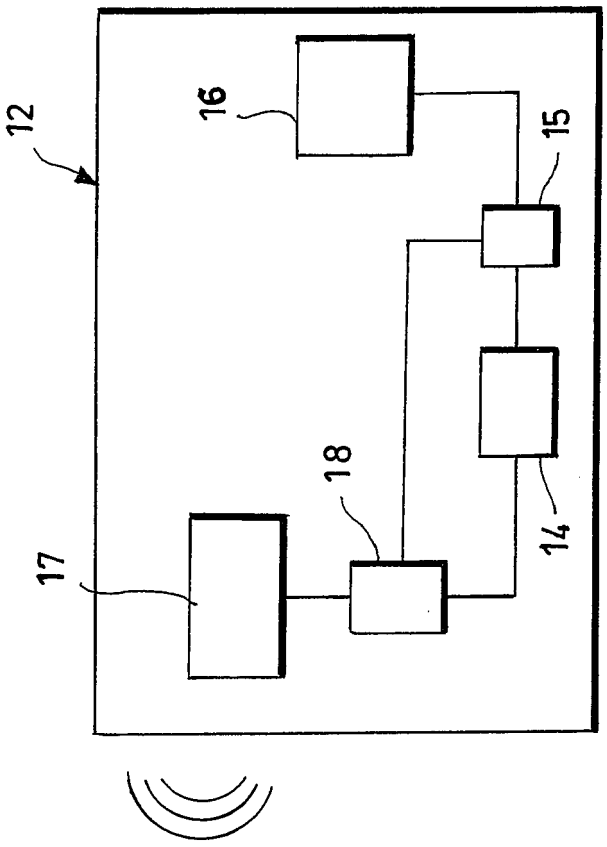


Fig.2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 17 0859

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/210277 A1 (DUBNACK STEFFEN [DE] ET AL) 21 September 2006 (2006-09-21) * paragraph [0024] - paragraph [0030] * * claims 34, 35 * -----	1-6	INV. G08C17/02 G08C23/04
A	US 2009/309550 A1 (LIU CHIH-MIN [TW]) 17 December 2009 (2009-12-17) * paragraph [0022] - paragraph [0035] * * paragraph [0043] - paragraph [0044] * -----	1-6	

TECHNICAL FIELDS SEARCHED (IPC)

G08C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 September 2015	Pham, Phong

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 17 0859

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-09-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006210277 A1	21-09-2006	DE 102005013063 A1	03-11-2005
		US 2006210277 A1	21-09-2006
US 2009309550 A1	17-12-2009	TW 200952303 A	16-12-2009
		US 2009309550 A1	17-12-2009

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82