



(51) International Patent Classification:
H02J 3/14 (2006.01)

(21) International Application Number:
PCT/BR2009/000263

(22) International Filing Date:
26 August 2009 (26.08.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PI0803883-0 26 August 2008 (26.08.2008) BR

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report (Rule 48.2(g))

(54) Title: A DEVICE AND METHOD OF MONITORING AND CONTROLLING THE STATE OF OPERATION OF ELECTRONIC APPARATUSES

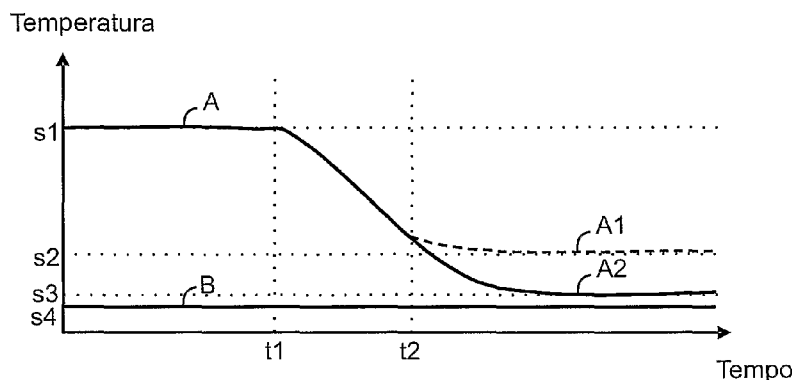


Fig. 2

(57) Abstract: The present invention relates to a device (1) of monitoring and controlling the state of operation of electronic apparatuses (2), wherein the apparatus (2) is electrically associable to a power supply source (3), capable of supplying electric current to the apparatus (2), by means of the monitoring and controlling device (1). The monitoring and controlling device (1) comprises at least one first temperature sensor (5) configured to measure temperature where the electric current supplied to the apparatus (2) by the power supply source (3) flows. In addition, the monitoring and controlling device (1) also comprises at least one switching means (8) operatively associated to the first temperature sensor (5). Said switching means (8) is capable of permitting or interrupting the conduction of electric current from the power supply source (3) to the apparatus (2) according to at least one value of temperature measurement made by the first temperature sensor (5). The present invention also relates to a method capable of providing the reduction of consumption of electric energy of electronic apparatuses (2), preventing them from remaining in a stand-by state for a relatively prolonged period of time.



Title: "A DEVICE AND METHOD OF MONITORING AND CONTROLLING THE STATE OF OPERATION OF ELECTRONIC APPARATUSES"

The present invention relates to a device for monitoring and controlling the state of operation of electronic apparatuses in general, capable of enabling the interruption of electric energy supply to them in an automatic manner, without the need for manual intervention by the user, thus preventing the latter from being in a stand-by state.

The present invention also relates to a method capable of providing the reduction of electric energy consumption of electronic apparatuses in general, preventing them from being in a stand-by state.

Description of the prior art

At present, electronic apparatuses such as electronic devices and apparatus of commercial and/or industrial application usually consume electric energy, even when they are theoretically turned off (in practice, they are at stand-by). For instance, when a television set is allegedly turned off by remote control, it comes into stand-by state, which allows it to be turned on in a remote and rapid manner, providing comfort and ease to the user.

However, even when an apparatus comes into the state of stand-by, it continues consuming electric power, even if in a smaller scale with respect to the situation in which it is on. Because of this, the stand-by state involves waste of electric energy, entailing a significant negative environmental impact, in addition to an additional cost in the user's electric power bill.

Thus, in order for an electronic apparatus to be really turned off the electric power network, it should be totally disconnected from the power supply source by means of a mechanism especially designed for this purpose (e.g. to implement a general on/off switch) or by the user manually, who should remove the apparatus plug from the socket. Usually, this procedure does not enable the apparatus to be turned off remotely and rapidly, so that the disconnection thereof should be made locally (e.g. turning off the general on/off switch) or by connecting again the connector of the apparatus to the socket by hand, which naturally causes trouble and dissatisfaction for the user.

In addition, in order to maintain comfort and ease for the user, one has developed ideas and solutions with a view to coupling the stand-by functions to the economy of energy. Different approaches aiming at this objective can be found in the patent documents described hereinafter.

5 International patent application WO 2007135429 describes an adaptor capable of providing economy of electric energy when an electronic apparatus is in its stand-by condition. The adaptor comprises at least one socket, which enables connection of an electronic apparatus (e.g. a television set) to a power supply network, associated to a electricity-consumption meter.

10 The adaptor isolates the apparatus from the power supply network when the energy consumption is lower than an established threshold, after a predetermined period of time has elapsed. The adaptor further comprises a control device, connected to the socket, which enables reconnection of the apparatus to the power supply network by means of a microprocessor and a signal

15 receiver which, in turn, is capable of recognizing a command (e.g. "on") from a remote control. The control device operates in low-energy mode and is provided with a transformer, which supplies energy to the microprocessor and to the receiver.

Brazilian patent application BR PI 0705996 relates to an automatic turning-off system by absence of consumption of one or more electronic apparatuses (e.g. a television set). Such a system is capable of disconnecting the apparatus from a power supply source after it remains a predetermined period of time in the stand-by condition, that is, after it has been allegedly turned off by remote control.

25 It should be noted that the objects described in the above-mentioned documents measure the state of the electronic apparatus by metering the electric current that circulates through a charge, which represents a disadvantage, since the measurements of electric magnitudes (e.g. current, voltage, power, etc.) require greater constructive complexity of the circuit and,

30 as a result, have high losses. So, although the objects described in the above-mentioned documents are capable of preventing waste of electric energy, their performance, simplicity and efficiency are significantly impaired.

Objectives of the invention

Therefore, a first objective of the present invention consists in providing a device that enables automatic monitoring and control over the state of operation of electronic apparatuses in general, thus providing reduction in their consumption of electricity in an efficient manner.

Besides, a second objective of the present invention is to provide a device that couples the stand-by functions of the electronic apparatuses, namely: rapidity and remote access when they are turned on again, with energy saving.

Additionally, a third objective of the present invention is to provide a device capable of maintaining comfort and ease for the user, providing functionality of the stand-by state of the electronic apparatuses, so as to avoid the need for additional manual intervention by the user, that is, keeping their original form of interaction with said apparatus.

Finally, it is a forth objective of the present invention to provide a method that enables automatic monitoring and control over the state of operation of electronic apparatuses in general, providing reduction in their consumption of electric energy in an efficient manner and still enabling rapidity and remote access to the apparatus when it is turned on, so as to provide comfort and ease to the user with economy of energy.

Brief description of the invention

The first, second and/or third objectives of the present invention are achieved by means of a device for monitoring and controlling the state of operation of electronic apparatuses, wherein said apparatus is electrically associable to an electric power source, capable of providing electric current to the apparatus, by means of the monitoring and controlling device. The monitoring and controlling device comprises at least a first temperature sensor configured to measure temperature where the electric current supplied to the apparatus by the power feed source flows. Besides, the monitoring and controlling device also comprises at least one switching means, operatively associated to the first temperature sensor. Said switching means is capable of permitting or interrupting the conduction of electric current from the power

supply source to the apparatus according to at least one value of temperature measurement made by the first temperature sensor.

A first way to achieve the fourth objective of the present invention is by means of a method for monitoring and controlling the state of operation of electronic apparatuses, wherein said apparatus is electrically associable to
5 an electric power supply source, capable of supplying electric current to the apparatus by means of the monitoring and controlling device. This method comprises the following steps:

- i) measuring temperature where the electric current supplied to
10 the apparatus by the power supply source flows; and
- ii) interrupting the conduction of electric current from the power supply source to the apparatus when one or more temperature (s) measured at step i) exhibits (exhibit) smaller variation (s) with respect to a reference temperature value; or permitting the conduction of electric current from the
15 power supply source to the apparatus when one or more temperature (s) measured at step i) exhibits (exhibit) greater variation (s) with respect to the reference temperature value.

A second way to achieve the fourth objective of the present invention is by means of a method for monitoring and controlling the state of operation of electronic apparatuses, wherein said apparatus is electrically
20 associable to power supply source, capable of supplying electric current to the apparatus, by means of the monitoring and controlling device. This method comprises the following steps:

- i) measuring temperature where the electric current supplied to
25 the apparatus by the power supply source flows;
- ii) measuring temperature where the electric current supplied to the apparatus by the power supply source does not flow;
- iii) comparing at least one temperature obtained at step i) with at least one temperature obtained at step ii); and
- 30 iv) interrupting the conduction of electric current from the power supply source to the apparatus when the comparison made at step iii) indicates that the temperatures measured at steps i) and ii) exhibit variation (s)

from each other with respect to a reference temperature-variation value; or permitting the conduction of electric current from the power supply source to the apparatus when the comparison made at step iii) indicates that the temperatures measured at steps i) and ii) exhibit variation (s) from each other with respect to the reference temperature-variation value.

Brief description of the drawings

The present invention will now be described in greater detail with reference to the attached drawings, in which:

- Figure 1 illustrates a device for monitoring and controlling the state of operation of electronic apparatuses according to a preferred embodiment of the present invention; and
- Figure 2 illustrates curves that represent the temperature behavior of the device illustrated in figure 1 along the time.

Detailed description of the figures and invention

Figure 1 illustrates a device 1 for monitoring and controlling the state of operation of electronic apparatuses 2 according to a preferred embodiment of the present invention. The apparatus 2 consists of a household appliance, commercial and/or industrial electronic apparatus, as for example a television set, a stereo, home-theater, among others.

It should be noted that, for this invention, one considers that the apparatus 2 has at least three states of operation, namely: "on", "off" or "stand-by". It is important to point out that in the "off" mode there is no circulation of current in the apparatus 2. Of course, in the "stand-by" mode there is smaller circulation of current in the apparatus 2 than in the "full operation" mode.

Preferably, but not compulsorily, the monitoring and controlling device 1 is of the stand-alone type, that is, it consists of an independent device capable of being connected externally to the apparatus 2. Optionally, the monitoring and controlling device 1 may be embedded on the apparatus 2, that is, it may consist of a dependent device, internally integrated into the apparatus 2.

As can be seen in figure 1, the apparatus 2 is electrically associ-

able to a power supply source 3 capable of supplying electric current to the apparatus 3 by means of a monitoring and controlling device 1. More specifically, the power supply source 3 is operatively associated to the apparatus 2 by means of an internal electronic circuit comprised by the monitoring and controlling device 1. The power supply source 3 consists of a source of alternating current, as for example household power point (socket). Preferably, the power supply source 3 is electrically associated to a power distribution network.

Further according to figure 1, the monitoring and controlling device 1 comprises at least one first temperature sensor 5, configured to measure one or more temperature values where the electric current supplied to the apparatus 2 by the electric supply source 3 flows. Such measurement (s) is (are) made at a point of the internal electronic circuit of the monitoring and controlling device 1 where conduction of the electric current supplied to the apparatus 2 by the power supply source 3 takes place.

In addition, the monitoring and controlling device 1 preferably comprises also at least one second temperature sensor 6, configured to measure one or more temperature values where the electric current supplied to the apparatus 2 by the power supply source 3 does not flow.

Such measurement (s) may be made at a point of the internal electronic circuit of the monitoring and controlling device 1 where no conduction of the electric current supplied to the apparatus 2 by the power supply source 3 takes place. Preferably, such measurement, made by the second temperature sensor 6, monitors the room temperature, but optionally it may be made, for instance, on a carcass of the monitoring and controlling device 1. The first and second temperature sensors 5, 6 are associated to conditioning circuits, so that the physical magnitudes can be converted into electric signals. Naturally, such sensors may be provided in the form of transducers.

The first 5 and second 6 sensors may be formed by NTC-type sensors or similar ones. Preferably, one employs temperature sensors of the SMD (Surface Mount Device) type, but other technologies may be used, in order to achieve the objectives of the present invention.

Additionally, the monitoring and controlling device 1 further comprises at least one comparator means 7, operatively associated to the first temperature sensor 5 and to the second temperature sensor 6, configured for comparing at least one value of measurement made by the first temperature sensor 5 with at least one value of measurement made by the second temperature sensor 6. The comparator means 7 may consist of an analog or digital comparator circuit commercially available in the form of an integrated circuit. Optionally, the comparator means 7 may be integrated (embedded) in a microprocessor and/or microcontroller, as will be explained later. It should be noted that the comparison may be made by using means of the temperatures measured by the first and/or second temperature sensors 5, 6, in order to obtain greater reliability, since the mean takes into consideration the temperature behavior all the time.

Further, the monitoring and controlling device 1 also comprises at least one switching means 8, operatively associated to the comparator means 7, capable of permitting or interrupting the conduction of electric current from the power supply source 3 to the apparatus 2 according to the result of the comparison made by the comparator means 7. The switching means 8 preferably consists of an on/off electric switch.

More specifically, the switching means 8 is configured to interrupt the conduction of electric current from the power supply source 3 to the apparatus 2 when one or more values of temperatures measured by the first temperature sensor 5 and by the second temperature sensor 6 exhibit smaller variation(s) with respect to a reference value of temperature variation. Such reference value of temperature variation may be pre-established according to experimental tests and/or theoretical calculations.

On the other hand, the switching means 8 is also configured to permit conduction of electric current from the power supply source 3 to the apparatus 2, when one or more reference values of temperatures measured by the first temperature sensor 5 and by the second temperature sensor 6 exhibit greater variation (s) with respect to the reference value of temperature variation.

It is also possible to implement a solution wherein the reference value of temperature variation that permits conduction of electric current differs from the reference value of temperature variation that permits interruption of electric current.

5 Thus, the monitoring and controlling device 1 permits that the state of operation of the apparatus 2 changes from "stand-by" mode to "off" mode automatically, without the need for the user to interfere manually (e.g. disconnecting the plug of the apparatus 2 from the socket manually). Because of this, a reduction of energy consumption is achieved and, as a result,
10 the negative impacts on the environment (better sustainability) are also reduced.

The monitoring and controlling device 1 further comprises at least one interface unit 9, configured to permit interaction between the user and the apparatus 2 by means of the monitoring and controlling device 1, that
15 is, to enable control of the apparatus 2 by the user in a direct manner.

Preferably, the interface unit 9 is provided with at least one light sensor, configured to detect a light stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source 3 to the apparatus 2. This light stimulus consists of an invisible light
20 spectrum (infrared) or alternatively a visible light spectrum.

Optionally, the interface unit 9 is provided with at least one sound sensor, configured to detect a sound stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source 3 to the apparatus 2.

25 Thus, the interface unit 9 is particularly important and useful when the user wishes that the apparatus 2 changes its state of operation from the "off" mode to the "on" ("full function") mode, so that he can use remote control (e.g. remote control of the apparatus 2) to switch on the apparatus 2 again remotely, in a rapid and simple way. By reason of this, comfort
30 and ease are provided to the user, since he does not need to reconnect the plug of the apparatus 2 to the power point by hand.

The monitoring and controlling device 1 further comprises at le-

ast one connection means, configured to permit simultaneous electric association of a plurality of electronic apparatuses 2 to the power supply source 3 by means of multiply plugs.

Preferably, the monitoring and controlling device 1 also comprises at least one processing unit 11, operatively associated to the first temperature sensor 5, to the second temperature sensor 6, to the comparator means 7, to the switching means 8, to the interface unit 9 and to the connection means 10. The processing unit 11 consists of a programmable microprocessor or microcontroller. Naturally, the processing unit 11 may be substituted with an equivalent electronic circuit, without detriment to the invention.

The processing unit 11 is configured to monitor and control the interaction between the first temperature sensor 5, the second temperature sensor 6, the comparator means 7, the switching means 8, the interface unit 9 and the connection means 10. In other words, the processing unit 11 is responsible for monitoring and controlling the flow of data between the elements of the monitoring and controlling device 1 and, in addition, providing commands to them. For instance, to turn on the apparatus 2 again, the user can actuate the interface unit 9, which will send a signal to the processing unit 11, which in turn permits the reestablishment of power supply to the apparatus 2. It is further possible to implement the comparator means 7 on the processing unit 11 itself in an integrated manner (embedded).

It is also an objective of the present invention to provide a method for monitoring and controlling the state of operation of electronic apparatuses 2, which comprises the following steps:

- i) measuring temperature where the electric current supplied to the apparatus 2 by the power supply source 3 flows;
- ii) measuring temperature where the electric current supplied by to the apparatus 2 by the power supply source 3 does not flow;
- iii) comparing at least one temperature obtained in step i) with at least one temperature obtained in step ii); and
- iv) interrupt the conduction of electric current from the power supply source 3 to the apparatus 2 when the comparison made in step iii)

indicates that the temperatures measured in steps i) and ii) exhibit smaller variation (s) from each other with respect to a reference value of temperature variation; or permitting conduction of electric current from the power supply source 3 to the apparatus 2 when the comparison made in step iii) indicates
5 that the temperatures measured in steps i) and ii) exhibit greater variation (s) from each other with respect to the reference value of temperature variation.

The method described above can be better understood by analyzing the graph illustrated in figure 2, which will be explained hereinafter.

The curves "A" and "B" represented in figure 2 show the behavior
10 of temperatures measured by the first temperature sensor 5 and by the second temperature sensor 6, respectively, along the time.

First, it should be noted that curve "B" remains substantially constant all the time at a relative low temperature s4. Naturally, this temperature s4 may exhibit small variations, which, however, do not impair the performance of this method or of the monitoring and controlling device 1.
15

In the interval between the 0 (zero) instant and the t1 instant, the apparatus 2 is in the "on" ("full function") state, at a relatively high temperature s1. At instant t1, the apparatus 2 is put in "stand-by" state. So, the temperature drops and, as a result, the curve "A" decreases gradually. In the case where the method of the present invention is not applied (monitoring and
20 controlling device 1 is not used), the curve "A" continues in the dashed curve "A1", which stabilizes (remains substantially constant) at a temperature level s2. On the other hand, when the method of the present invention is applied, the curve "A" continues in the continuous curve "A2", which stabilizes (remains substantially constant) at a temperature level s3, lower than temperature s2. In this way, as can be seen in the graph, at instant t2 the interruption ("A2") or permission ("A1") of the conduction of electric current from the power supply source 3 to the apparatus 2 takes place. It should be noted that
25 the temperature is proportional to the electric current of the apparatus 2, that is, the higher the temperature the higher the consumption of electric current or electric power consumed by the apparatus 2.
30

The difference existing between temperatures s3 (curve "A2")

and s4 (curve "B") is due to a minimum consumption of electric energy by the monitoring and controlling device 1, necessary to keep the interface unit 9 active, in order to permit the reestablishment of conduction of electric current from the power supply source 3 to the apparatus 2 remotely (e.g. remote control apparatus) when the user so desires.

This method further comprises an additional step v) of detecting a sound stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source to the apparatus 2, if the conduction of electric current has been interrupted in step iv.

Optionally, step v may exhibit a variant, namely: detecting a visible or invisible (e.g. infrared) light stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source to the apparatus, if the conduction of electric current has been interrupted in step iv.

Simplified embodiment

A simplified embodiment of the present invention may be obtained by using, at first, only the first temperature sensor 5 and the switching means 8.

In this regard, analogously to the preferred embodiment of the present invention, the switching means 8 is operatively associated to the first temperature sensor 5 and is capable of permitting or interrupting the conduction of electric current from the power supply source 3 to the apparatus 2, according to at least one temperature measurement made by the first temperature sensor 5.

In this case (simplified embodiment), the switching means 8 is configured to interrupt the conduction of electric current from the power supply source 3 to the apparatus 2 when one or more values of temperatures measured by the first temperature sensor 5 is (are) lower than the reference temperature value. On the other hand, the switching means 8 is configured to permit the conduction of electric current from the power supply source 3 to the apparatus 2 when one or more values of temperatures measured by the first temperature sensor 5 is (are) higher than the reference temperature

value. Such reference temperature value may be pre-established according to experimental tests and/or theoretical calculations or still vary according to another parameter such as, for example, room temperature.

Naturally, the monitoring and controlling device 1 may also comprise the interface unit 9, the connection means 10 and the processing unit 11, as described above (evidently excluding the second temperature sensor 6). It should be noted that it is further possible to implement the processing unit 11, which carries out the comparison (s) between the temperature (s) measured by the first temperature sensor 5 with the reference temperature value. Optionally, one may also implement a comparator integrated circuit, which performs this function.

In this simplified embodiment, the method for monitoring and controlling the state of operation of the electronic apparatuses 2 comprises the following steps:

- i) measuring temperature where the electric current supplied to the apparatus 2 by the electric power source 3 flows; and
- ii) interrupting the conduction of electric current from the power supply source 3 to the apparatus 2 when one of more temperature (s) measured in step i) exhibits (exhibit) variation (s) lower than the reference temperature value; or permit the conduction of the electric current from the power supply source 3 to the apparatus 2 when one or more temperature (s) measured in step i) exhibits (exhibit) variation (s) higher than the reference temperature value.

Thus, when the monitoring and controlling device 1 is in the "on" ("full function") mode and is put in "stand-by" mode, the temperature measured by the first temperature sensor 5 should decrease gradually, and in this case if it drops lower than a reference temperature value, the supply of electric current to the monitoring and controlling device 1 is interrupted by the switching means 8. On the other hand, if the reading (measurement) of the first temperature sensor 5 indicates that the temperature is beyond the reference temperature value, the supply of electric current to the monitoring and controlling device 1 is maintained by the switching means 8.

This method further comprises an additional step iii) of detecting a sound stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source to the apparatus, if the conduction of electric current has been interrupted in step ii).

5 Optionally, step iii) may exhibit a variant, namely: detecting a visible or invisible (e.g. infrared) light stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source to the apparatus, if the conduction of electric current has been interrupted in step ii).

10 Preferred examples of embodiments having been described, it should be understood that the scope of the present invention embraces other possible variations, being limited only by the contents of the accompanying claims, which include the possible equivalents.

CLAIMS

1. A monitoring and controlling device (1) for monitoring and controlling the state of operation of electronic apparatuses (2), the apparatus (2) being electrically associable to a power supply source (3) by means of the
5 monitoring and controlling device (1), the power supply source (3) being capable of supplying an electric current to the apparatus (2), the monitoring and controlling device (1) being characterized by comprising at least:

- one first temperature sensor (5) configured to measure temperature where the electric current supplied to the apparatus (2) by the power
10 supply source (3) flows; and

- one switching means (8) operatively associated to the first temperature sensor (5), the switching means (8) being capable of permitting or interrupting the conduction of electric current from the power supply source (3) to the apparatus (2) according to at least one value of temperature measurement made by the first temperature sensor (5).
15

2. A device according to claim 1, characterized in that the switching means (8) is configured to interrupt the conduction of electric current from the power supply source (3) to the apparatus (2) when one of more values of temperatures measured by the first temperature sensor (5) is (are) lower than
20 a reference temperature value.

3. A device according to claim 2, characterized in that the switching means (8) is configured to permit the conduction of electric current from the power supply source (3) to the apparatus (2) when one or more values of temperatures measured by the first temperature sensor (5) is (are) higher
25 than the reference temperature value.

4. A device according to claim 1, characterized by comprising at least:

- one second temperature sensor (6) configured to measure temperature where the electric current supplied to the apparatus (2) by the
30 power supply source (3) does not flow;

- a comparator means (7) operatively associated to the first temperature sensor (5) and to the second temperature sensor (6), the compara-

tor means (7) being configured to compare at least one measurement made by the first temperature means (5) with at least one measurement made by the second temperature sensor (6),

the comparator means (7) being operatively associated to the
5 switching means (8), the switching means (8) being capable of permitting or interrupting the conduction of electric current from the power supply source (3) to the apparatus (2) according to the result of the comparison made by the comparator means (7).

5. A device according to claim 4, characterized in that the switch-
10 ing means (8) is configured to interrupt the conduction of electric current from the power supply source (3) to the apparatus (2) when one or more values of temperatures measured by the first temperature sensor (5) and one or more values of temperatures measured by the second temperature sensor (6) exhibits (exhibit) variation (variations) from each other lower than a reference
15 value of temperature variation.

6. A device according to claim 5, characterized in that the switch-
ing means (8) is configured to permit the conduction of electric current from the power supply source (3) to the apparatus (2), when one or more values of temperatures measured by the first temperature sensor (5) and one or more
20 values of temperatures measured by the second temperature sensor (6) exhibits (exhibit) variation (s) from each other higher than the reference value of temperature variation.

7. A device according to any one of the preceding claims, characterized by comprising an interface unit (9) configured to permit interaction
25 between the user and the apparatus (2) by means of the monitoring and controlling device (1).

8. A device according to claim 7, characterized in that the interface unit (9) is provided with at least one sound sensor configured to detect a sound stimulus capable of permitting the reestablishment of the conduction of
30 electric current from the power supply source to the apparatus (2).

9. A device according to claim 7 or 8, characterized in that the interface unit (9) is provided with at least one light sensor configured to de-

tect a light stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source (3) to the apparatus (2).

10. A device according to any one of the preceding claims, characterized by comprising at least one connection means (10) configured to permit simultaneous electric association of a plurality of electronic apparatuses (2) to the power supply source (3).

11. A device according to claims 9 and 10, characterized by comprising at least one processing unit (11) operatively associated to the first temperature sensor (5), to the switching means (8), to the interface unit (9) and to the connection means (10), the processing unit (11) being configured to monitor and control the interaction between the first temperature sensor (5), the switching means (8), the interface unit (9) and the connection means (10).

12. A device according to claims 4 and 11, characterized in that the processing unit (11) is operatively associated to the second temperature sensor (6) and to the comparator means (7), the processing unit (11) being configured to monitor and control the interaction between the first temperature sensor (5), the second temperature sensor (6), the comparator means (7), the switching means (8), the interface unit (9) and the connection means (10).

13. A device according to any one of the preceding claims, characterized by being embedded in the apparatus (2).

14. A method for monitoring and controlling the state of operation of electronic apparatuses (2), the apparatus (2) being electrically associable to a power supply source (3), the power supply source (3) being capable of supplying electric current to the apparatus (2), the method being characterized by comprising the following steps:

- i) measuring temperature where the electric current supplied to the apparatus (2) by the power supply source (3) flows; and
- ii) interrupting the conduction of electric current when one or more temperature (s) measured in step i) exhibits (exhibit) variation (s) lower than a reference value of temperature; or permitting the conduction of electric cur-

rent from the power supply source (3) to the apparatus (2) when one or more temperature (s) measured in step i) exhibits (exhibit) variation (s) higher than the reference value of temperature.

15 15. A method according to claim 14, characterized by comprising a step iii) of detecting a sound stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source (3) to the apparatus (2), if the conduction of electric current has been interrupted in step ii).

10 16. A method according to claim 14, characterized by comprising a step iii) of detecting a light stimulus capable of permitting the reestablishment of the conduction of electric current from the power supply source (3) to the apparatus (2), if the conduction of electric current has been interrupted in step ii).

15 17. A method for monitoring and controlling the state of operation of apparatuses (2), the apparatus (2) being electrically associable to a power supply source (3), the power supply source (3) being capable of supplying electric current to the apparatus (2), the method being characterized by comprising the following steps:

20 i) measuring temperature where the electric current supplied to the apparatus (2) by the power supply source (3) flows;

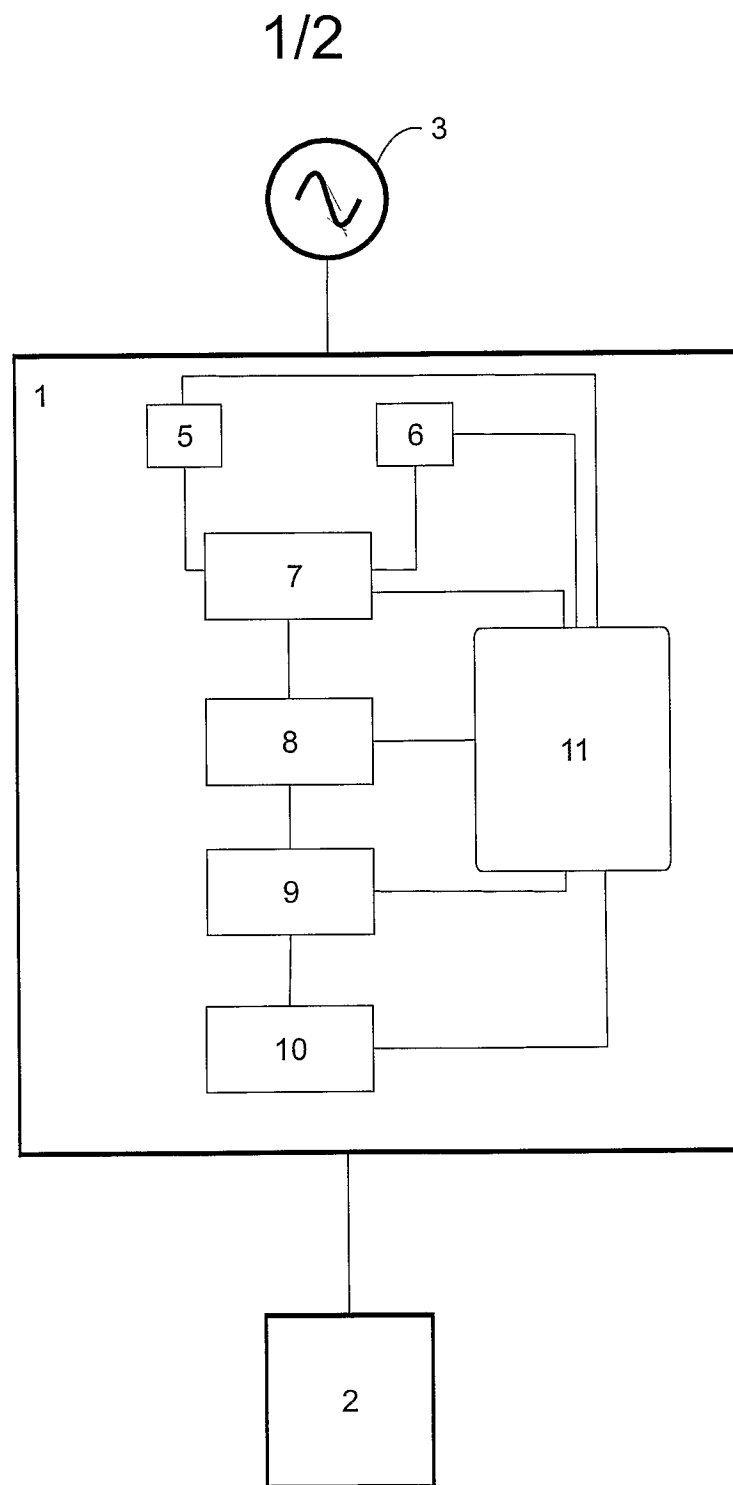
 ii) measuring temperature where the electric current supplied to the apparatus (2) by the power supply temperature (3) does not flow;

 iii) comparing at least one temperature obtained in step i) with at least one temperature obtained in step ii); and

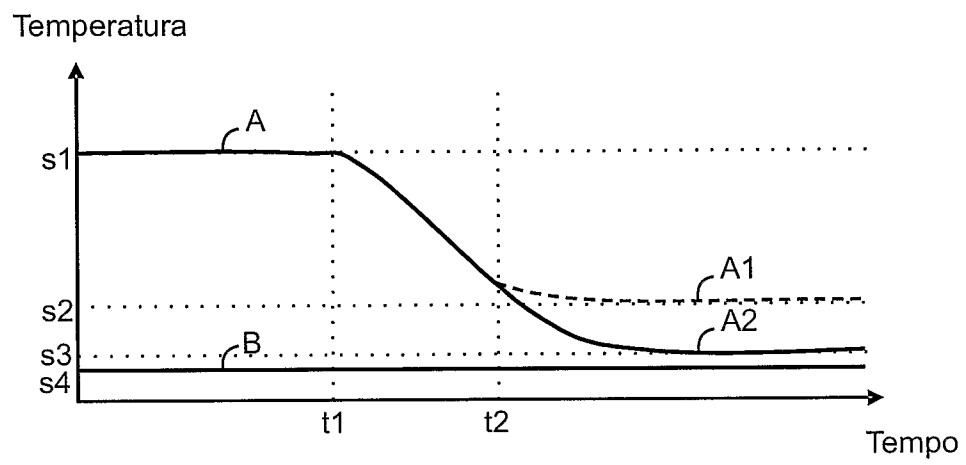
25 iv) interrupting the conduction of electric current from the power supply source (3) to the apparatus (2) when the comparison made in step iii) indicates that the temperatures measured in steps i) and ii) exhibit variation (s) from each other lower than a reference value of temperature variation; or permitting the conduction of electric current from the power supply source (3)
30 to the apparatus (2) when the comparison made in step iii) indicates that the temperatures measured in step i) and ii) exhibit variation (s) from each other higher than the reference value of temperature variation.

18. A method according to claim 17, characterized by comprising
a step v) of detecting a sound stimulus capable of permitting the reestablish-
ment of the conduction of electric current from the power supply source (3) to
the apparatus (2), if the conduction of electric current has been interrupted in
5 step iv).

19. A method according to claim 17, characterized by comprising
a step v) of detecting a light stimulus capable of permitting the reestablish-
ment of the conduction of electric current from the power supply source (3) to
the apparatus (2), if the conduction of electric current has been interrupted in
10 step iv).

*Fig. 1*

2/2

**Fig. 2**