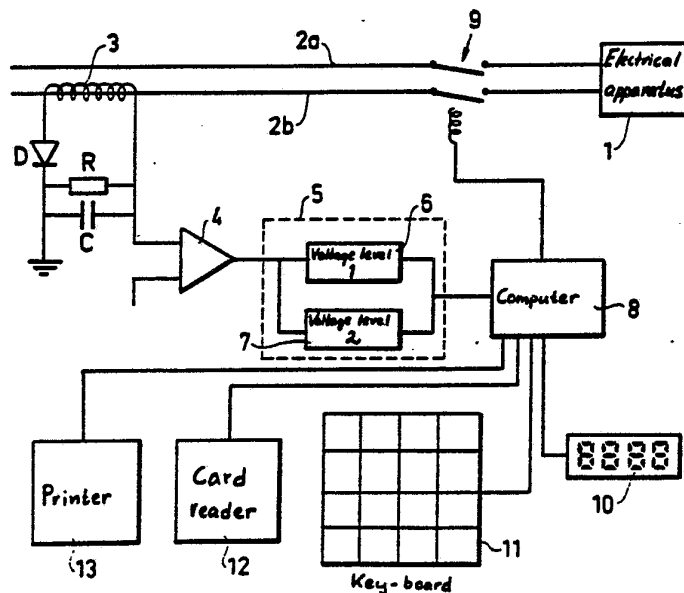


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: CONTROL DEVICE, ESPECIALLY FOR COPYING MACHINES



(57) Abstract

A control device for monitoring the proper use of an electrical apparatus (1), especially a copying machine, which is connected to a current source via an electric cable (2a, 2b). The device comprises a current sensor (3), e.g. an induction coil, which upon sensing a flowing current delivers a voltage signal to a voltage detector device (5) adapted to detect a characteristic current variation, occurring when the apparatus is used, and thereupon deliver an operation indication pulse to a control unit (8), in particular in the form of a computer, which is connected, on the one hand, to an authority check unit (12, 11), through which a user of the apparatus can feed an authorization signal to the control unit, and, on the other hand, to a switch (9) for interrupting the supply current to the apparatus in the absence of said authorization signal.

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Control device, especially for copying machines

5 The invention relates to a control device for monitoring the proper use of an electrical apparatus, especially a copying machine.

10 The background of the invention is the heavily increasing volume of copies which are produced by means of copying machines at most offices. A major problem in this connection is that of unauthorized copying which often takes place to a relatively great extent. Moreover, for a given copying machine, there are difficulties in dividing the arising costs properly.

15 The object of the invention is to solve this problem and, thus, to effect an authority check and possibly even recordal of the respective operator's use of the apparatus by simple means which do not require any modification of the apparatus.

20 This object is achieved while using the electric power cable of the apparatus by means of a control device, which is characterized by

- 25 - a current sensor, e.g. an induction coil, adapted to sense the current through the electric cable and, when a current flows through the cable, to deliver a voltage signal to
- 30 - a voltage detector device adapted to detect a characteristic current variation occurring when the apparatus is used and thereupon deliver at least one operation indication pulse to
- 35 - a control unit which is connected, on the one hand, to an authority check unit, through which a user of the electrical apparatus can feed an authorization signal into the control unit, and, on the other hand, to a switch for interrupting the supply current to the apparatus in the absence of said authorization signal.

Hereby, it is possible to effectively accomplish the desired authority check without any substantial modification of the electrical apparatus. Normally, it is sufficient to replace the electric supply cable of the apparatus or to insert a current sensor and switch unit therein. Thus, there is no problem in using the invention in previously installed apparatus. For example, in a previously installed copying machine, one can replace the old electric cable by a new cable provided with a current sensor and switch unit. If necessary, this cable can be provided with a strong protective shield, and the connection within the apparatus can be sealed.

Further embodiments of the invention are defined in the sub-claims and will be apparent from the detailed description below.

A preferred embodiment of the invention will now be described with reference to the appended drawing.

Fig. 1 shows a simplified block diagram illustrating the essential parts of a control device according to the invention;

Fig. 2 show a current diagram illustrating the operation of the device of Fig. 1.

Thus, Fig. 1 illustrates schematically an electrical apparatus 1, the authorized use of which is to be checked and possibly recorded, the apparatus being connected to the electrical network (not shown) by means of an electrical supply cable, the phase and neutral conduits 2a, 2b of which are shown, whereas the earth conduit has been left out on the drawing.

For sensing a characteristic current variation in the conduits 2a, 2b, occurring when the apparatus 1 is being used, an induction coil 3 is disposed with its coils extending around one of the conduits, e.g. the neutral conduit 2b. The current variations in the neutral conduit 2b will cause an induced alternating voltage on the coil 3. This alternating voltage is rectified by means of a diod D and will charge a condensor C being connected in

parallel with a resistor R, and the voltage of the condenser C is applied to a voltage detecting device 5 via an amplifier 4.

In the illustrated example, the electrical apparatus 1 is assumed to be a copying machine which is preheated by thermostatic control in a conventional manner in its stand-by state, wherein it operates with two predetermined current values between which switching takes place while being thermostatically controlled. When copying, an additional current flows (light and motor power) which is superposed as a pulse onto the respective current level, as illustrated in Fig. 2, where I_0 and I_0' denote the two current levels in the stand-by state, whereas I_1 and I_2 denote the current levels when copying takes place.

The voltage detector device 5 (fig. 1) is consequently provided with two voltage level sensors 6 and 7, which are connected in parallel to each other for sensing of a respective voltage level (in practice a relatively narrow voltage interval) corresponding to the current levels I_1 and I_2 . In case of copying, one of the voltage level sensors 6 or 7 delivers an operation indication pulse to a control unit constituted by a computer 8, which checks whether an authorization signal has been given from its peripheral equipment and which, in the absence of such an authorization signal, interrupts the supply current to the copying machine 1 by means of a switch 9 that interrupts the phase and neutral conduits 2a, 2b but, of course, not the earth conduit of the cable.

The computer 8 can be programmed for immediate interruption in which case not even the first copy will be delivered from the copying machine to an unauthorized user. In general, however, it is preferred to let the working cycle for one copy be completed and, thus, to interrupt the current after a corresponding time period, e.g. 5-10 seconds. Reconnection of the current should not take place until an authorized user or operator has fed an authorization signal into the computer 8.

A display unit 10, a key-board 11, a card reader 12 and a printer 13 are preferably connected to the computer. Authorized users are given ordinary plastic cards provided with a magnetic strip which are inserted into the card reader 12 before copying.

5 Hereby, the computer will receive the necessary authorization signal, and the copying process can proceed without current interruption. The display unit 10 indicates whether an authorized card has been inserted into the card reader 12 and, thereupon, the number of copies taken (or cost or e.g. the remaining part
10 of a budgeted cost, etc).

The key-board 11 can be used as a supplement to the card reader 12, e.g. for entering a personal code, as in cash delivery machines, in order to prevent unauthorized use of the plastic
15 cards. Alternatively, the card reader 12 can be omitted, in which case the authorization code is entered via the key-board 11 to provide authorization signals to the computer.

Without difficulties and while copying, the computer 8 can be
20 programmed so as to count the number copies and to store the count results accumulated for each user or group of users. For example, a supervisor or head operator can effect a print-out by means of the printer 13 at desired times, the print-out listing the various user's accumulated number of copies for
25 the preceding time period.

It is understood that the invention may be advantageously used at other electrical apparatuses than copying machines, e.g. other kinds of office equipment or apparatus in public
30 environment.

C. L A I M S

1. Control device for monitoring the proper use of an electrical apparatus which is connected to a current source via an electric cable (2a,2b), characterized by

- a current sensor (3) adapted to sense the current through the electric cable and, when a current flows through the electric cable, to deliver a voltage signal to
- a voltage detector device (5) adapted to detect a characteristic current variation occurring when the apparatus is used and thereupon deliver at least one operation indication pulse to
- a control unit (8), which is connected, on the one hand, to an authority check unit (12,11), through which a user of the electrical apparatus can feed an authorization signal into the control unit, and, on the other hand, to a switch (9) for interrupting the supply current to the apparatus in the absence of said authorization signal.

2. A control device as defined in claim 1, characterized in that the current sensor is constituted by an induction coil (3) adapted to sense the current in at least one of the conduits (26) of the cable.

3. A control device as defined in claim 1 or 2, characterized in that the current sensor (3) is connected to a rectifier (D) and a condenser (C), the voltage of which is applied to said voltage detector device (5).

4. A control device as defined in anyone of claims 1-3, characterized in that the voltage detector device (5) comprises at least one voltage level sensor (6,7), which delivers said operation indication pulse when the voltage signal exceeds a predetermined voltage level.

5. A control device as defined in claim 4, wherein the electrical apparatus (3) is constituted by a copying machine, which in its stand-by state is thermostatically controlled and operates with two current levels (I_0 , I_0'), characterized in that the voltage detector device (5) comprises two parallel voltage level sensors (6,7), each delivering an operation indication pulse upon receipt of a voltage signal within a voltage level interval corresponding to a current pulse (I_1, I_2) occurring when copying and being superposed onto the respective current level.

6. A control device as defined in anyone of claims 1-6, characterized in that said switch (9) is connected in said electric cable for interrupting the phase and neutral conduits (2a,2b) thereof.

7. A control device as defined in anyone of claims 1-6, characterized in that said control unit is constituted by a computer (8) with associated peripheral equipment (10-13) including said authority check unit (11,12).

8. A control device as defined in claim 7, characterized in that the peripheral equipment of the computer (8) includes a card reader (12), in which the user can insert an authorization card.

9. A control device as defined in claim 7 or 8, characterized in that said peripheral equipment includes a key-board (11).

10. A control device as defined in anyone of claims 7-9, characterized in that the computer (8) is adapted to record and store each user's use of the apparatus.

Fig. 1

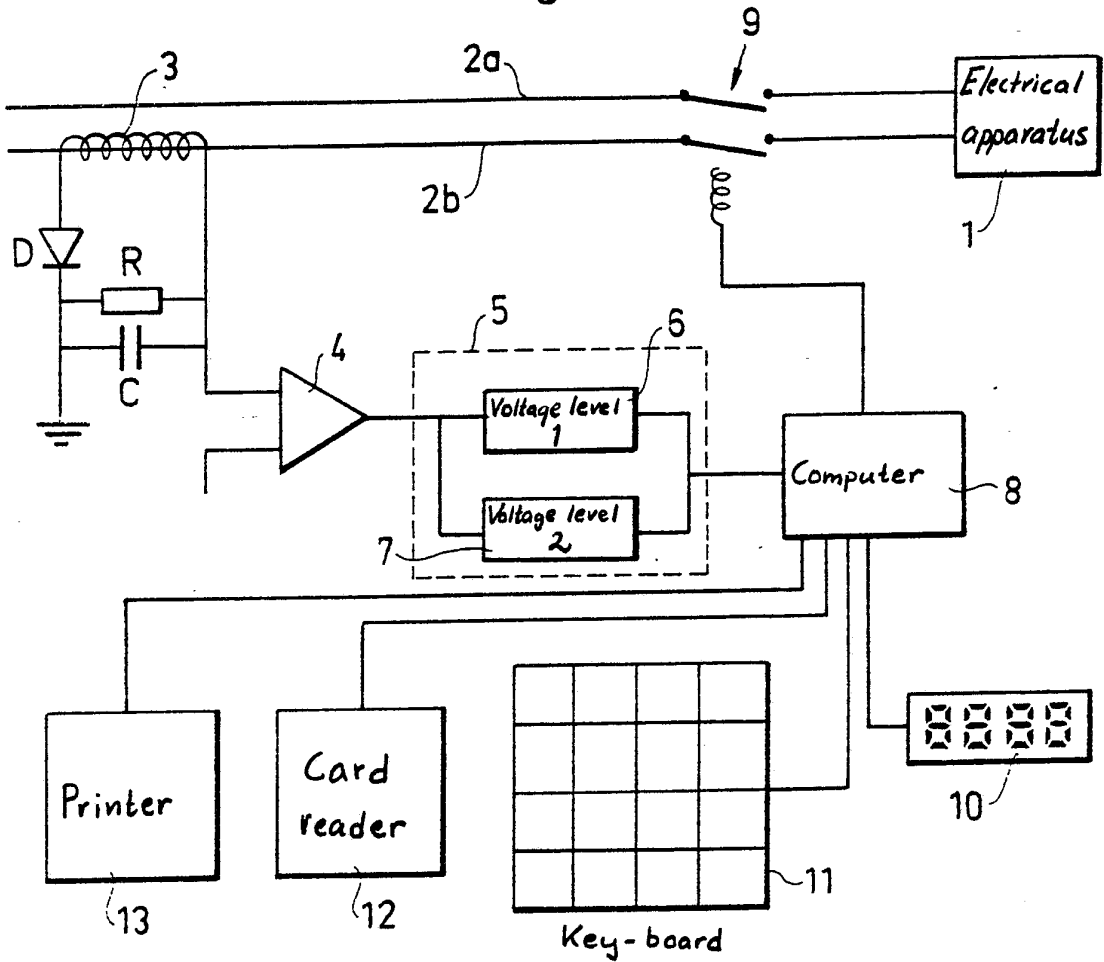
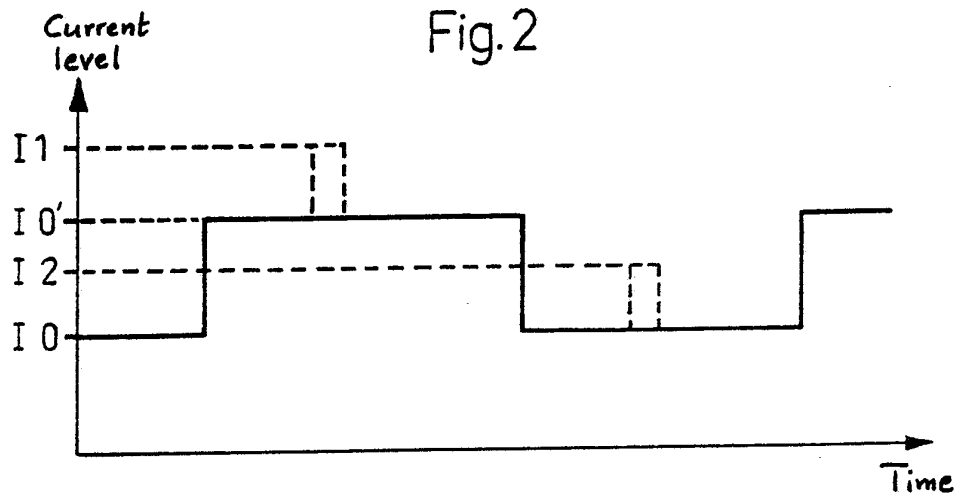


Fig. 2



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE85/00090

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC ⁴ G 07 C 9/00		
II. FIELDS SEARCHED Minimum Documentation Searched ⁷ Classification System Classification Symbols IPC 4 B 41 F 33/00, 02; B 41 L 39/00, 02; G 03 G 15/00; G 07 C 9/00, 11/00; G 07 F 7/00, 02, 08, 10, 15/00- 18, 17/20, 28, 30, 42 .../...		
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸ SE, NO, DK, FI classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	GB, A, 2 077 189 (NIPPONDENSO CO. LTD ET AL) 16 December 1981, see column 2, line 25 - column 3, line 86.	1,7,8,10
A	US, A, 4 260 878 (KAWAMURA ET AL) 7 April 1981, see column 2, line 33- column 3, line 26.	1
A	EP, A1, 0 015 120 (SOUTH EASTERN ELECTRICITY BOARD) 3 September 1980, see figure 2.	1,2,6-10
A	CA, A, 952 606 (HECON CORPORATION) 6 August 1974, see page 13, line 29- page 14, line 10.	1
P	EP, A2, 0 121 332 (NEUMANN ET AL) 10 October 1984, see page 2, lines 21-25; page 3, lines 20-27; figure 2.	1,6,7,9,10
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search 1985-04-22		Date of Mailing of this International Search Report 1985-04-29
International Searching Authority Swedish Patent Office		Signature of Authorized Officer <i>Hans Bandelin</i> Hans Bandelin

L.E.

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II Fields searched (cont).

US CI 200:42-45;
235:375, 376, 383, 385;
340:149R, 825.3-825.35

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

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2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

The additional search fees were accompanied by applicant's protest.

No protest accompanied the payment of additional search fees.