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(11) Publication number:

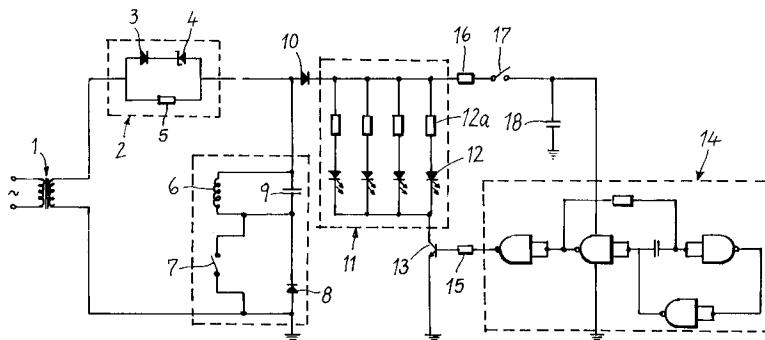
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EUROPEAN PATENT APPLICATION(21) Application number: **92120073.9**(51) Int. Cl.⁵: **E05B 47/00**(22) Date of filing: **25.11.92**(30) Priority: **05.12.91 IT BO910457**(43) Date of publication of application:
09.06.93 Bulletin 93/23(84) Designated Contracting States:
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I-20123 Milan (IT)**(54) **Luminous indication system for electric locks.**

(57) Luminous indication system for electric locks, characterized in that it comprises a circuit (2) connected in series to an alternating supply voltage, suitable to allow the predominantly unidirectional flow of the current and to generate a constant voltage at its ends during said flow, the coil (6) of the electromagnet and a first rectifier diode (8), said circuit (2) comprising a diode (3) which is biased inversely with respect to said first rectifier diode (8), and furthermore characterized in that a local push-button (7) is arranged in parallel to said first rectifier

diode (8), whereas a series connection of a second rectifier diode (10), of a luminous indicator (11) and of a semiconductor component (13) for controlling said luminous indicator (11) is arranged in parallel to said coil (6) and to said first rectifier diode (8), said semiconductor component (13) being driven by an oscillator (14) which is connected to said second rectifier diode (10) through a contact (17), said contact (17) opens when the door containing the electric lock is in a closed position.

*Fig. 1***EP 0 545 252 A1**

The present invention relates to a luminous indication system for electric locks.

As is known, electric locks installed in doors and gates for access to buildings comprise an electromagnet which causes the retraction of the spring-latch when it is energized.

The electromagnet is controlled by means of a local pushbutton which is arranged on the lock itself or in the immediate vicinity thereof and/or by means of one or more remote pushbuttons located in the building.

The technical aim of the present invention is to provide a system which can visually indicate to the user the open condition of the lock when it is activated either by a remote pushbutton or by a local pushbutton.

Within the scope of this aim, an object of the present invention is to provide a system which has an extremely modest power absorption.

A further object of the invention is to provide a system wherein the number of remote pushbuttons can be increased at will without constituting an excessive load.

This aim and these objects are achieved by a luminous signalling system for electric locks, characterized in that it comprises a circuit connected in series to an alternating supply voltage, suitable to allow the predominantly unidirectional flow of the current and to generate a constant voltage at its terminals during said flow, the coil of the electromagnet and a first rectifier diode, said circuit comprising a diode which is biased inversely with respect to said first rectifier diode, and furthermore characterized in that a local pushbutton is arranged in parallel to said first rectifier diode, whereas a series connection of a second rectifier diode, of a luminous indicator and of a semiconductor component for controlling said luminous indicator is arranged in parallel to said coil and to said first rectifier diode, said component being driven by an oscillator which is connected to said second rectifier diode through a contact which is actuated so that it opens when the door is in closed position.

Further peculiarities of the invention will become apparent from the following description on the basis of the illustrated examples, wherein:

figure 1 is the electric diagram of an indication system which provides exclusively for actuation by means of a local pushbutton; and

figure 2 is the electric diagram of an indication system which provides for actuation by means of a local pushbutton and a plurality of remote pushbuttons.

With reference to figure 1, the system comprises a transformer 1 whose primary winding is connected to the ordinary power supply network (for example 220 V), whereas a significantly lower operating voltage (for example 12 V) can be drawn

from the secondary winding.

One terminal of the secondary winding is connected to the ground, whereas the other terminal is connected to a circuit 2 which can supply predominantly unidirectional current, generating a constant and stabilized voltage at its terminals during the flow of said current. The circuit 2 is composed of a rectifier diode 3 arranged in series to a Zener diode 4 and of a resistor 5 in parallel to said diodes 3 and 4.

One terminal of the coil 6 of the electromagnet which actuates the opening of the lock is connected to the circuit 2. The opposite terminal of the coil 6 can be connected to the ground through a local pushbutton 7 which can be installed in the lock itself or in the vicinity of the door in which the lock is installed.

A rectifier diode 8 is connected in parallel to the pushbutton 7, which is normally open, whereas a capacitor 9, which acts as filter, is connected in parallel to the coil 6. The diode 8 is biased inversely with respect to the diode 3, so that no flow of current normally occurs through the coil.

The anode of a diode 10 is connected to the point of the circuit which is comprised between the circuit 2 and the coil 6, and a luminous indicator, generally designated by the reference numeral 11, is connected to the cathode of said diode 10. Said indicator is constituted by a plurality of light-emitting diodes (LEDs) 12 with related protection resistors 12a arranged in series thereto. The diodes 12 and the resistors 12a are connected in parallel and lead into the collector of a semiconductor 13 which is constituted by a transistor of the NPN type whose emitter is grounded.

The transistor 13 is driven by an oscillator 14 whose output is connected to the base of the transistor 13 by means of a resistor 15.

The input of the oscillator is connected to the cathode of the diode 10 by means of a resistor 16 and of a microswitch or a reed contact 17 which is open when the lock or door is in closed position.

The described circuit is completed by a capacitor 18 which acts as filter when the reed contact 17 is closed.

The operation of the described system is as follows.

When the door is closed, the contact 17 is open, and therefore the oscillator 14 is inactive. Accordingly, the transistor 13 is off and no current can flow through the LEDs 12, which remain off. Since the diodes 3 and 8 are reverse biased, only an extremely small current can flow through the coil of the electromagnet 6 due to the presence of the resistor 5; said current is in any case insufficient to energize the electromagnet of the lock which, therefore, remains inactive.

By acting on the local pushbutton 7, the diode 8 is shorted, so that a current high enough to allow the activation of the electromagnet flows through the diodes 3 and 4; by opening the lock, said electromagnet closes the reed contact 17 and supplies voltage to the oscillator 14.

The pulsed voltage at the output of the oscillator switches on the transistor 13, which allows the flow of current through the LEDs 12 of the indicator 11. The LEDs therefore emit a pulsed light (blinking) at the frequency of the oscillator which indicates the "door open" condition.

It should be noted that by releasing the local pushbutton the flow of current through the coil of the electromagnet is interrupted, but the blinking of the LEDs 12 continues until the door is closed again. In fact, when the door closes, the reed contact 17 opens and the oscillator is deactivated, with the above specified consequences, which lead to the switching off of the transistor 13 and to the switching off of the LEDs 12.

The described system is susceptible to numerous modifications and variations, all of which are within the scope of the following claims.

One of these variations provides for the possibility of activating the electromagnet by means of remote pushbuttons, for example installed inside the building and controlled by one or more users. For this purpose, the remote pushbuttons 19 are connected in parallel to the circuit 2, and a light-emitting diode (LED) 20, a limiting resistor 21 and a rectifier diode 22 are connected in parallel to each remote pushbutton; said rectifier diode 22 is reverse-biased with respect to the diode 8, so that no current flows through the coil 6 when the door is closed, i.e. when the reed contact 17 is open.

By actuating any remote pushbutton 19, the diodes 20 and 22 and the resistor 21 are shorted, allowing the flow of current through the coil 6 and the opening of the lock.

When the lock opens, the reed contact 17 closes, activating the oscillator 14 and starting the blinking of the LEDs 12. At the same time, by releasing the remote pushbutton 19, the LEDs 20 related to all the remote pushbuttons are subjected to the direct voltage of the circuit 2 and blink with the same frequency as the LEDs 12, which is set by the oscillator 14 and for all the time during which the door remains open.

An advantage of the present invention is constituted by the fact that the LED switch-on current does not flow through the coil of the electromagnet, so that there is no limit to the number of remote pushbuttons which can be installed.

In the practical embodiment of the invention, the components are not subjected to particular stresses, so they may be chosen among those easily commercially available.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Luminous indication system for electric locks, characterized in that it comprises a circuit (2) connected in series to an alternating supply voltage, suitable to allow the predominantly unidirectional flow of the current and to generate a constant voltage at its ends during said flow, the coil (6) of the electromagnet and a first rectifier diode (8), said circuit (2) comprising a diode (3) which is biased inversely with respect to said first rectifier diode (8), and furthermore characterized in that a local pushbutton (7) is arranged in parallel to said first rectifier diode (8), whereas a series connection of a second rectifier diode (10), of a luminous indicator (11) and of a semiconductor component (13) for controlling said luminous indicator (11) is arranged in parallel to said coil (6) and to said first rectifier diode (8), said semiconductor component (13) being driven by an oscillator (14) which is connected to said second rectifier diode (10) through a contact (17), said contact (17) opening when the door containing the electric lock is in a closed position.
2. System according to claim 1, characterized in that said circuit (2) comprises a rectifier diode (3) and a Zener diode (4) which are mutually in series and a resistor (5) which is in parallel to said diodes.
3. System according to claim 1 or 2, characterized in that said luminous indicator (11) comprises a plurality of light-emitting diodes (12) connected in parallel to each other and in series with the emitter-collector circuit of a transistor (13) whose base is connected to the output of said oscillator (14), the input of said oscillator being connected, by means of a reed contact or a microswitch (17), to a point located between said circuit (2) and said coil (6) through said second diode (10).
4. System according to one or more of the preceding claims, characterized in that at least one remote contact (19) is connected in parallel to said circuit (2), a rectifier diode (22), a light-emitting diode (20) and a limiting resistor

(21) being mutually connected in series and connected in parallel to said remote contact (19), said rectifier diode (22) being reverse-biased with respect to said first diode (8) which is connected in parallel to said local pushbutton (7). 5

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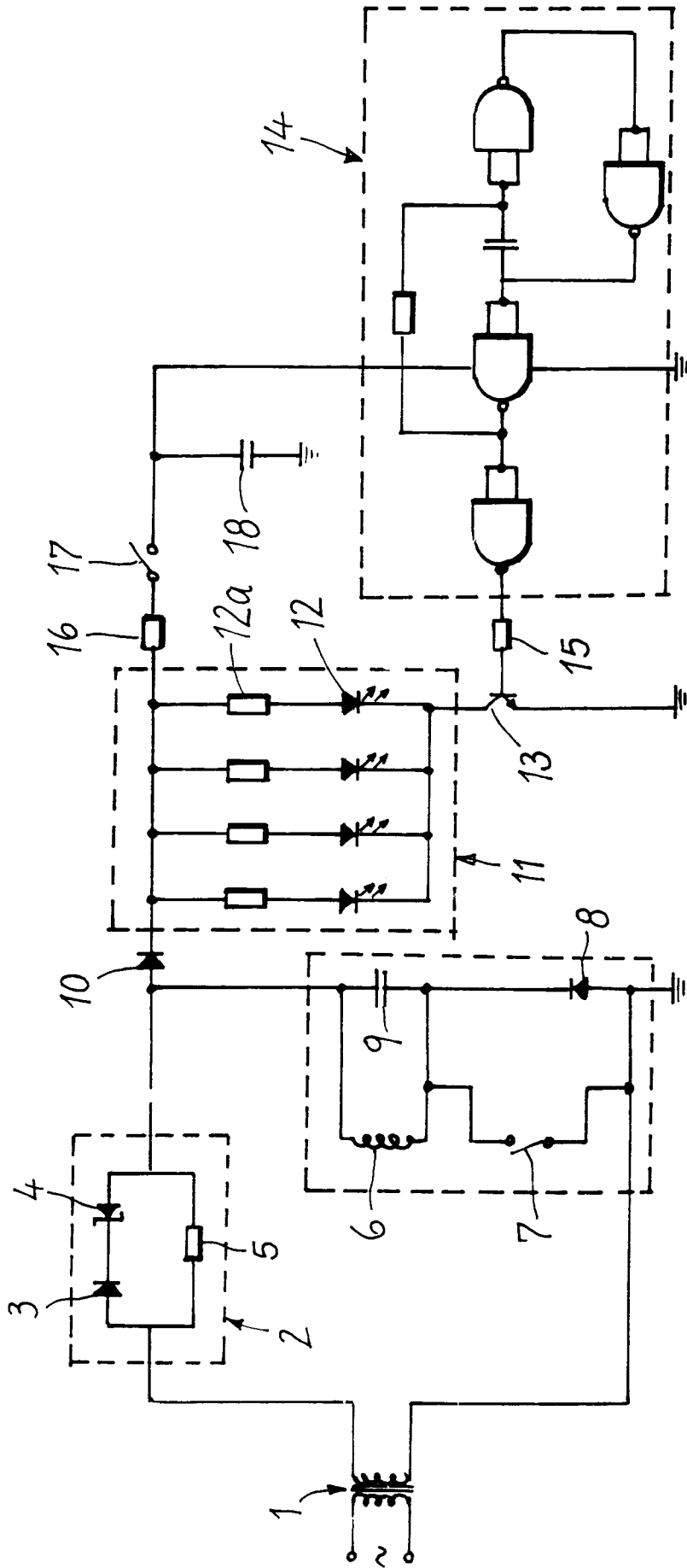
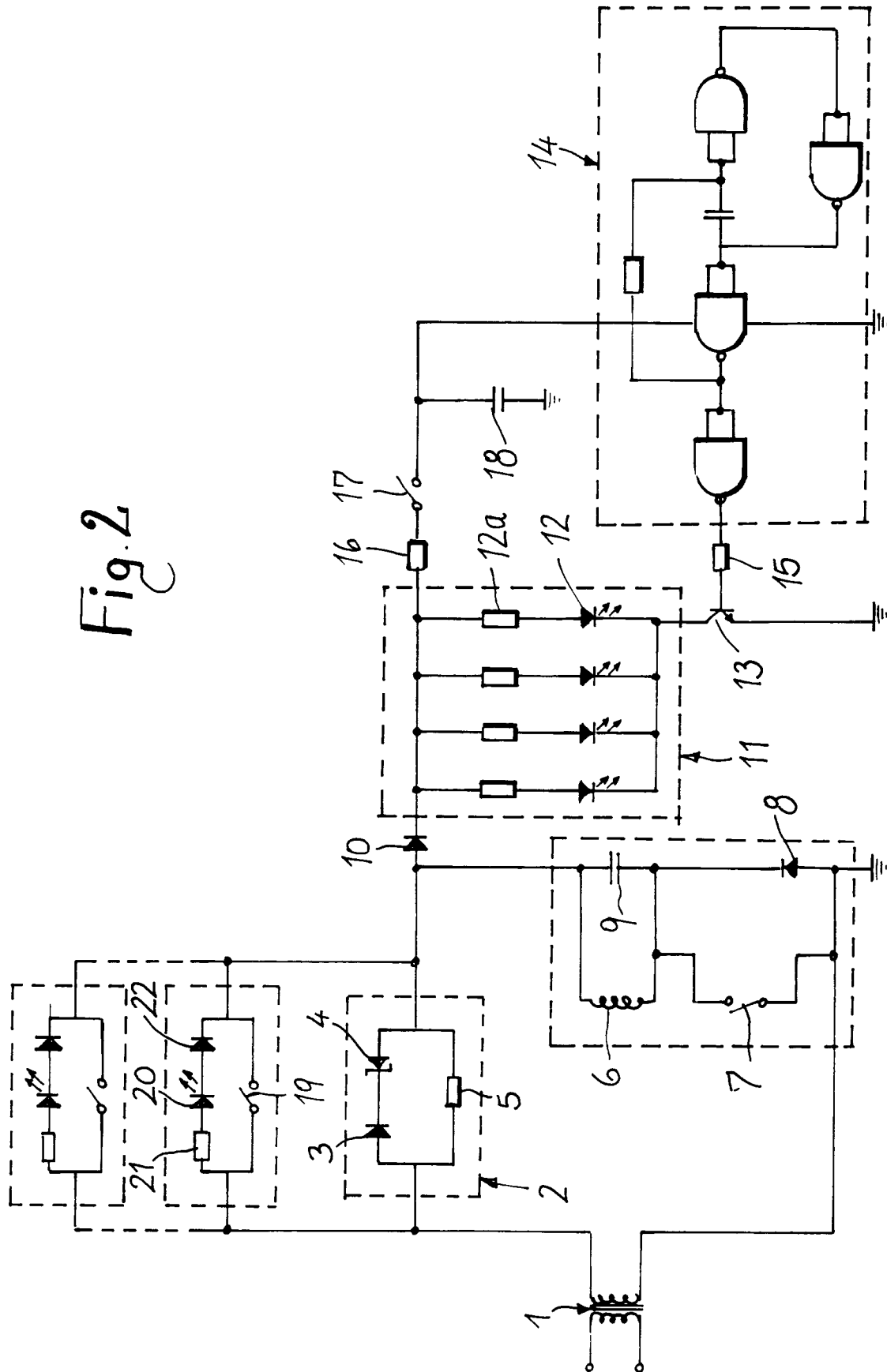


Fig. 1





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EUROPEAN SEARCH REPORT

Application Number

EP 92 12 0073

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 593 543 (R.T. STEFANEK) * column 5, line 10 - line 15; figure 26 * -----	1	E05B47/00
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 MARCH 1993	Examiner GERARD B.
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			