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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **A method for clearing unlocking key codes in an electronic locking device.**

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Description

This invention relates to a method for clearing unlocking key codes from an electronic locking device.

In comparison with mechanical locking devices, electronic locking devices, in which the unlocking circuit is arranged to be actuated when the code of a magnetic card read by the card reader agrees with an unlocking key code set in the memory, have large merits in security and are widely used in facilities where a large number of locking devices are required such as safes in hotels.

Such electronic locking devices installed in guest rooms of hotels require alteration of the unlocking key code of a room whenever a guest changes. If such clearing of key codes could be effected by anyone at any time, the electronic locking devices would become useless.

It is, therefore, necessary to arrange the electronic locking device so that the unlocking codes are cleared only when certain conditions are met. To be more specific, when a card (hereinafter called a clearing card) storing a certain code is inserted into the card reader of the electronic locking device. In the context of this invention, the term "clearing of key codes" is to be construed as enabling the memory under specified conditions by cancelling the flag of the memory storing key codes.

As proposed in Specification WO 80/02711, a control code such as provided on say a master key carried by a member of the hotel's staff is first entered, and then, and only then, can a new guest input a new opening code into the device for use in future to open the door of the safe. A disadvantage of this is that a guest cannot simply input his own new code in private and change it at will.

The present invention was made in view of the aforementioned circumstance, and it is an objective of the invention to make the clearing of unlocking key codes easier while retaining security of normal operation.

According to the invention there is provided a method for clearing unlocking key codes in an electronic locking device for a door to a secure space, in which the door can be opened to obtain access to that space and closed to prevent access to that space, and in which an unlocking circuit is arranged to be actuated when the code of a magnetic card read by a card reader agrees with one of a number of unlocking key codes set in the memory, characterised by using a first clearing card which will function only when the door associated with the locking device is open and a second clearing card which will function only when the door is closed, setting the codes of the first and second clearing cards in specified separate addresses in the memory in the code setting mode for setting the codes of the clearing cards in the processing unit of the electronic locking device, determining whether the door is open or closed in the normal operation mode of the processing unit, and clearing the unlocking key codes only when the code read by the card reader is identical to the code of the first clearing card set in the above-mentioned manner and the door is open, or when the code read by the card reader is identical to the code of the second clearing card set in the above-mentioned manner and the door is closed.

One form of electronic locking device which can be unlocked in an emergency is described in our European Patent Application No. 87304540.5, Serial No 250 101, and reference is made to that Application for a full description.

An example of one preferred embodiment of the unit for clearing unlocking key codes of an electronic locking device will now be described with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of the electronic locking device used in one preferred embodiment of the present invention;

Figure 2 is a flowchart of the key code setting operation for that device of Figure 1; and

Figure 3 is a flowchart showing one example of unlocking key code clearing operation in one preferred embodiment of the present invention.

The method for clearing unlocking key codes in this preferred embodiment is used in, for instance, an electronic locking device for hotels, such as a personal safe for guests as used in a hotel room, and the configuration of such an electronic locking device is shown in Figure 1.

The device includes a card reader 1 for reading the code from a card having a code encoded on a magnetic strip on the card. Most credit and charge cards have such a strip and are well known. A first auxiliary memory 2 is provided for storing the code read by the card reader 1. The device has a second auxiliary memory 3 and a main memory 4 for storing the unlocking codes. A display 5 will indicate if the contents of the first auxiliary memory 2 have been stored in the main memory 4. A microprocessor (CPU) 6 is provided for processing signals and controlling an unlocking circuit 7 for executing unlocking according to the unlocking signal given by the CPU 6. A multi-position switch 8 is available for manual selection of the operation mode of the CPU 6 according to the following positions:

0 ..... Normal operation mode of the electronic locking device
1 ..... Global master key setting position;
2 ..... First floor master key setting position;
3 ..... Second floor master key setting posi-

tion;
4 ..... First area master key setting position;
5 ..... Second area master key setting position;
6 ..... Third area master key setting position;
7 .... . First maid key setting position;
8 ..... Second maid key setting position;
A ..... Emergency key setting position;
B ..... Test key setting position;
C ..... Double-lock/unlock key setting position;
D ..... First clearing key setting position;
E ..... Second clearing key setting position;
F ..... Third clearing key setting position

Of these switch positions, the "0" position is the normal operation mode of the electronic locking device in which the locking device will be opened when the code of a magnetic card read by the card reader 1 agrees with a code set in the main memory 4, and setting of guest key codes is also made in this switch position. The position from "1" to "F" are for setting keys to be kept by hotel employees of the respective positions. Setting of codes for the employees keys can be effected by setting the multiposition switch 8 in the respective positions allocated to the respective keys, and inserting each key, a magnetic card, in the card reader 1 at least twice till, for example, the display 5 is lit up by the operation of the CPU 6 as shown by the flowchart in Figure 2.

Of these keys for employees, the keys of "1" to "C" can unlock the locking devices at their respective levels by first setting their codes as shown above, setting the multiposition switch 8 in the "0" position, and inserting the key card into the card reader.

The first, second and third clearing keys to be set in the switch positions D, E and F respectively enable the main memory to store a code or codes of a guest key or keys or clear the storage areas of the main memory 4 for setting a code or codes of a guest key or keys in the normal operation mode (switch position: "O") of the electronic, locking device when the door is open (when the inner lever on the door is operated), when the door is closed, and when the door is either open or closed, respectively. When a key card set in one of these switch positions is inserted into the card reader 1 in the normal operation mode of the electronic locking device, according to, for example, the operation procedure of the flowchart of Figure 3, the CPU 6 will clear the guest key code or codes in the main memory 4, and the code of a magnetic card to be inserted in the card reader 1 in this mode will be stored in the main memory 4 as an unlocking code (unlocking key code) of the guest key. Once a guest key or keys is set in the aforementioned manner, the CPU 6 will not allow setting codes of any magnetic cards as unlocking codes unless one of the clearing key card is inserted into the card reader 1 according to the position (open or closed) of the door. It is possible to arrange the electronic locking device so that after setting a guest key code or codes as shown above, if the door is not opened at least once within the specified time span, the code of the first card to be inserted into the card reader 1 after the elapse of the time span is set as an unlocking key code.

As described so far, this invention makes the use of the electronic locking device easier while retaining its security.

Claims

1. A method for clearing unlocking key codes in an electronic locking device for the door to a safe, in which an unlocking circuit (7) is arranged to be actuated when the code of a magnetic card read by a card reader (1) agrees with one of a number of unlocking key codes set in the memory (D,B), characterised by using a first clearing card which will function only when the safe door is open and a second clearing card which will function only when the safe door is closed, setting the codes of the first and second clearing cards in specified separate addresses (D,B) in the memory in the code setting mode for setting the codes of the clearing cards in the processing unit (6) of the electronic locking device, determining whether the door is open or closed in the normal operation mode of the processing unit (6), and clearing the unlocking key codes only when the code read by the card reader (1) is identical to the code of the first clearing card set in the above-mentioned manner and the safe door is open, or when the code read by the card reader is identical to the code of the second clearing card set in the above-mentioned manner and the safe door is closed.

Revendications

1. Procédé d'effacement de codes de clés de déverrouillage dans un appareil électronique de verrouillage de la porte d'un coffre, dans lequel un circuit (7) de déverrouillage est destiné à être manoeuvré lorsque le code d'une carte magnétique, lu par un lecteur (1) de carte, correspond à l'un de plusieurs codes de clés de déverrouillage conservés dans la mémoire (D, B), caractérisé par l'utilisation d'une première carte d'effacement qui ne fonctionne que lorsque la porte du coffre est ouverte, et d'une seconde carte d'effacement qui ne fonc-

tionne que lorsque la porte du coffre est fermée, par la mise des codes de la première et de la seconde carte d'effacement dans des adresses séparées spécifiées (D, B) dans la mémoire en mode d'établissement de code permettant l'établissement des codes des cartes d'effacement dans l'unité (6) de traitement de l'appareil électronique de verrouillage, par détermination de l'ouverture ou de la fermeture de la porte en mode de fonctionnement normal de l'unité de traitement (6), et par effacement des codes de clés de déverrouillage uniquement lorsque le code lu par le lecteur de carte (1) est identique au code de la première carte d'effacement établi de la manière précitée et la porte du coffre est ouverte, ou lorsque le code lu par le lecteur de carte est identique au code de la seconde carte d'effacement établi de la manière précitée et la porte du coffre est fermée.

Patentansprüche

1. Verfahren zum Löschen des Öffnungs-Codes in einer elektronischen Verschlußeinrichtung für die Tür eines Safes, in welcher ein Öffnungskreis (7) vorgesehen ist, der anspricht, wenn der Code einer Magnetkarte, gelesen durch einen Kartenleser (1), mit einer Anzahl von Öffnungs-Codes übereinstimmt, die im Speicher (D,B) enthalten sind,
dadurch gekennzeichnet,
daß eine erste Löschkarte eingesetzt wird, welche nur anspricht, wenn die Safetür geschlossen ist, daß die Codes der ersten und zweiten Löschkarte in spezielle, separate Adressen (D, B) in dem Speicher und in eine Prozessor-Einheit (6) der elektronischen Verschließeinrichtung umgesetzt werden, abhängig davon, ob die Tür bei der normalen Betriebsart der Prozessor-Einheit (6) offen oder geschlossen ist und daß die Öffnungs-Codes nur gelöscht werden, wenn der durch den Kartenleser (1) gelesene Code dem Code der ersten Löschkarte entspricht, der in der oben erwähnten Weise eingegeben wurde, und die Safetür offen ist, oder wenn der vom Kartenleser gelesene Code dem Code der zweiten Löschkarte entspricht, der in der oben erwähnten Weise eingegeben wurde, und die Safetür geschlossen ist.

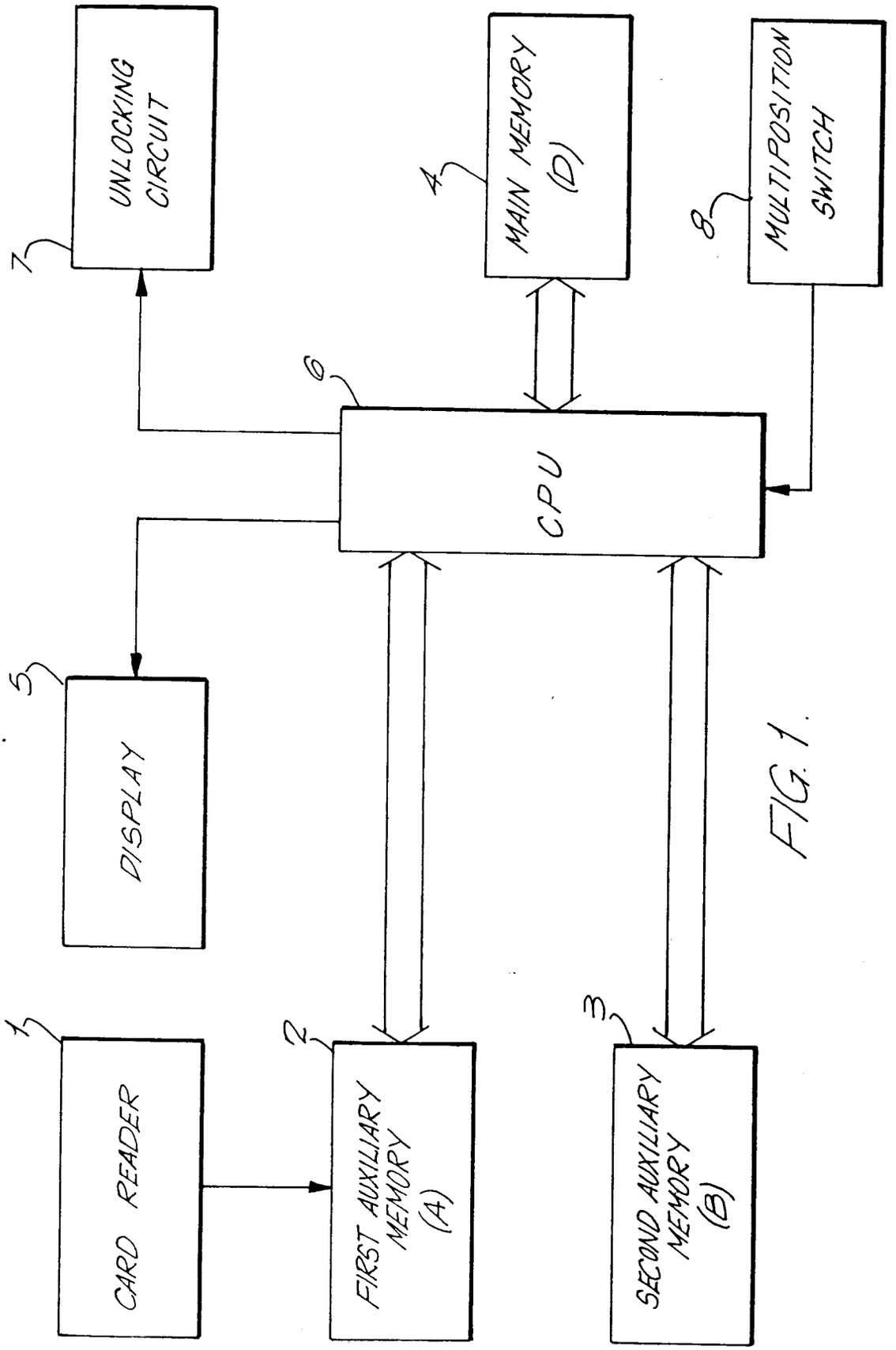
UNLOCKING CIRCUIT
7
MAIN MEMORY (D)
4
MULTIPOSITION SWITCH
8
6
CPU
DISPLAY
5
CARD READER
1
FIRST AUXILIARY MEMORY (A)
2
SECOND AUXILIARY MEMORY (B)
3

FIG. 1.

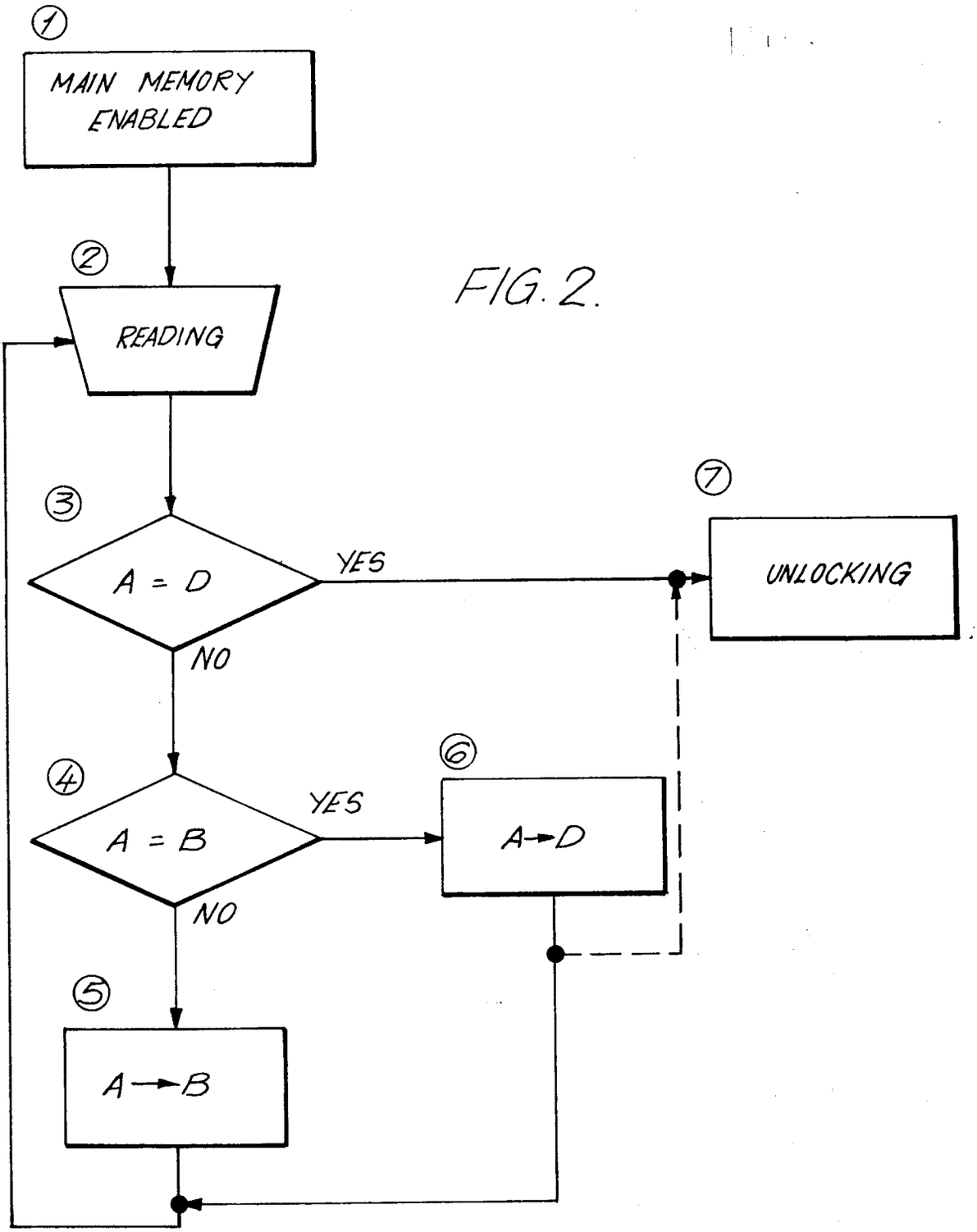
1
MAIN MEMORY ENABLED
2
READING
3
A = D
YES
NO
7
UNLOCKING
4
A = B
YES
NO
6
A→D
5
A→B

FIG. 2.

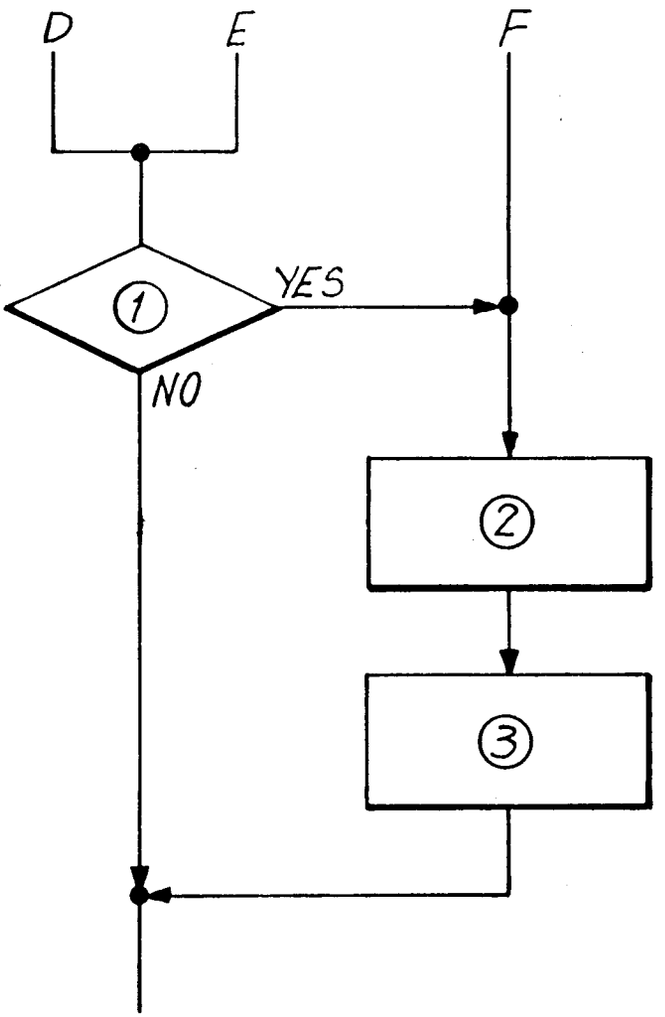

FIG. 3.

① IS THE DOOR OPEN ?
(IS THE INNER LEVER
ON THE DOOR BEING
OPERATED)

② GUEST KEY MEMORY CLEARING
(ALLOWING WRITING OF GUEST KEY CODE)

③ DISPLAY