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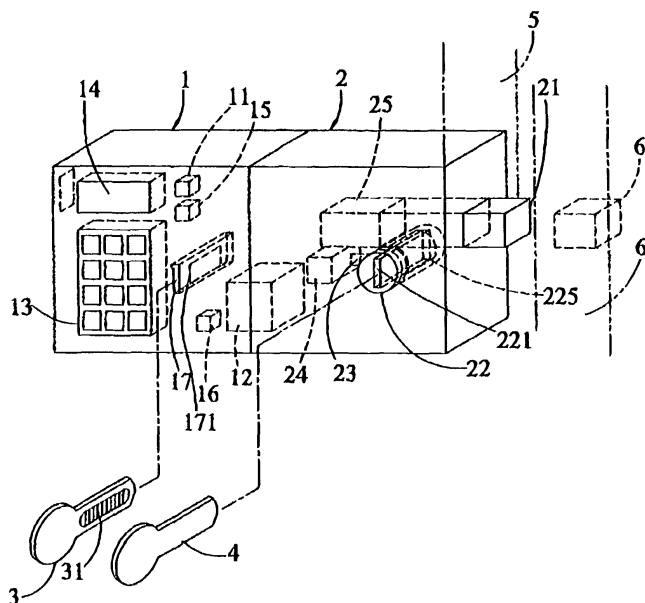
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(54) Electronic lock system

(57) An electronic lock system includes a recognition device (1) including a microprocessor (11), a scanner (12), an input element (13), a display unit (14), a memory device (15), and a data-scanning comparator (16). The scanner (12), the input element (13), the display unit (14), the memory device (15), and the data-scanning comparator (16) are electrically connected to the microprocessor (11), respectively. A lock assembly (2) has a lock operator (21) for selectively locking/unlocking the lock system, an actuating device (22) for driving the lock operator (21), a fastener (23) for engaging with the actuating device (22), and a fastening controller. A controlling device has a first marker, wherein

the microprocessor will generate a signal for allowing a user to change valid data stored in the memory device corresponding to the first marker after scanning the first marker; and a driving device having a second marker which is scanned by the scanner for obtaining scanned data to be compared with the corresponding valid data stored in the memory device after inserting the driving device into the actuating device, wherein if the scanned data is valid, the microprocessor will generate a control signal to be sent to the fastening controller for disengaging the fastener from an aperture of the actuating device. The user can update the corresponding valid data stored in the memory device at any time without replacing the lock system.

FIG. 1



## Description

**[0001]** The present invention is related to electronic lock systems and, more particularly, to a door security system, the locked/unlocked state of which is controlled by a microprocessor and a driving device which can be optionally replaced.

**[0002]** Currently, a mechanically structured door lock using a key to control the locked and unlocked states of a door latch has been gradually substituted by an electrically controlled door lock which typically employs an access code system, for example, a key pad or a card reader for receiving an access code input by a user of the door to identify whether the input access code is valid through a recognition device, and to them output a control signal generated from a microprocessor to cause the door latch to be released for access.

**[0003]** The major difference between the mechanically structured door lock and the electrically controlled door lock is that the latter does not need a general key to lock /unlock the door so that it is unnecessary for a user to carry the bulky key. However, the electrically controlled door lock still has the following disadvantages: (1) The access code system of the electrically controlled door lock can only be accessed outdoors or disposed on the wall near the door so that it is easily damaged, thereby resulting in safety and maintenance problems; (2) The user must always remember the access code of keypad-type door lock; however, in these changing times, the number of personal passwords used for a variety of electronic products increase daily. Therefore, because the user must remember so many passwords, he may easily become confused or forget the password, thereby resulting in inconvenient use. (3) If using a card-type door lock, the magnetic tape attached on the back of magnetic card is easily damaged because of being bent or exposed under circumstances which can cause the magnetic tape to lose its magnetism, with the result that the locked door lock can not be opened. (4 ) For a conservative user, he/she is unlikely to accept the keypad-type door lock or card-type door lock because both utilize an electronic technique rather than the insertion and rotation of a conventional key. (5) Because the keypad-type door lock or card-type door lock placed outdoors is easily damaged, the locked state of the door lock may also open once the access code system is damaged. Thus, security must be heightened.

**[0004]** Alternatively, when the car keys are misplaced, lost or stolen, a significant portion of time and money with need to be expended for unlocking doors, electronically rekeying the lock system, and replacing lost keys.

**[0005]** According to the present invention, the electronic lock system includes a recognition device including a microprocessor, a scanner, an input element, a display unit, a memory device, and a data-scanning comparator, wherein the scanner, the input element, the display unit, the memory device, and the data-scanning comparator are electrically connected to the microproc-

essor, respectively; a lock assembly having a lock operator for selectively locking/unlocking the lock system, an actuating device for driving the lock operator, a fastener for engaging with the actuating device, and a fastening controller; a controlling device having a first marker, wherein the microprocessor will generate a signal for allowing a user to change valid data stored in the memory device corresponding to the first marker after scanning the first marker; and a driving device having a second marker which is scanned by the scanner for obtaining scanned data to be compared with the corresponding valid data stored in the memory device after inserting the driving device into the actuating device, wherein if the scanned data is valid, the microprocessor will generate a control signal to be sent to the fastening controller for disengaging the fastener from an aperture of the actuating device.

**[0006]** The present invention can provide a door locking system with the high security which is difficult to damage, and wherein its driving key can be easily replaced.

**[0007]** The present invention provides an electronic lock system without the need to input any access code.

**[0008]** The present invention also provides an electronic lock system which uses a general key to electronically drive and control the door bolt and electronically control the engagement of the door bolt. The user can only replace the key without changing the entire lock system when the key is misplaced, lost or stolen.

**[0009]** The present invention provides an electronic lock system which uses a single key to control the locked and unlocked state of various door locks.

**[0010]** The electronic lock system is convenient for the key assembly and for changing the stored key data to meet enhanced security requirements.

**[0011]** After the control device is inserted into the driving device, the marker attached on one side of the control device can be scanned by the bar code scanner. The scanned optical signal is converted to a digital signal and then the digital signal is sent to the data-scanning comparator via the microprocessor. The digital signal is compared with the corresponding valid data stored in the memory. If the digital signal is valid, the microprocessor will send out a signal to turn on the power of the input element so as to allow the user to change the valid data stored in the memory. The user can update the corresponding valid data stored in the memory device without replacing the lock system at any time.

**[0012]** Preferably, the input element is a key pad and the display unit is a liquid crystal display.

**[0013]** The electronic lock system of the present invention can be applied to the door lock. The system includes a recognition device including a microprocessor, a scanner, an input element, a display unit, a memory device, and a data-scanning comparator, wherein the scanner, the input element, the display unit, the memory device, and the data-scanning comparator are all electrically connected to the microprocessor, respectively; a

lock assembly having a door bolt, an actuating device for driving the door bolt to reciprocate, a fastener for engaging with the actuating device, and a fastening controller for engaging/disengaging the fastener with/from the actuating device; a control key having a first marker, wherein the microprocessor will generate a signal for allowing a user to change valid data stored in the memory device corresponding to the first marker after scanning the first marker; and a driving key having a second marker which is scanned by the scanner for obtaining scanned data to be compared with the corresponding valid data stored in the memory device after inserting the driving device into the actuating device, wherein if the scanned data is valid, the microprocessor will generate a control signal to be sent to the fastening controller for disengaging the fastener from an aperture of the actuating device.

**[0014]** The lock assembly further includes a sliding slot for allowing the door bolt to slide therein, and a resilient element outwardly urging against the door bolt for keeping the door bolt extending into a hole disposed on a door frame. The door bolt has a plurality of continuously spacedly disposed slots at the bottom thereof and the actuating device has a plurality of toothed structures disposed along a periphery at one end thereof to be engaged with the slots of the door bolt so as to reciprocate with the door bolt when the actuating device is driven.

**[0015]** Both the control key and driving key have prior bar codes attached or etched thereon, respectively. Taking advantage of the variety, stability, and readability of the bar code, the driving key can be manufactured in masse and matched with various bar codes. Thus, when the key is misplaced, lost or stolen, it is unnecessary to make a new key according to the originally selected key mode, thereby saving time and eliminating inconvenience.

**[0016]** Certainly, the electronic lock system of the present invention can also be applied in the switch control of a car.

**[0017]** The present invention may best be understood through the following description with reference to the accompanying drawings, in which:

Fig. 1 is a schematic diagram showing a preferred embodiment of the electronic lock system according to the present invention;

Fig. 2 is a partially amplified view of the door bolt and the actuating device shown in Fig. 1;

Fig. 3 is a block diagram of the recognition device of the preferred embodiment of the electronic lock system according to the present invention; and

Fig. 4 is a flow chart showing the operating procedure of the preferred embodiment of the electronic lock system according to the present invention.

**[0018]** As shown in Fig. 1, the electronic lock system according to the present invention includes a recognition device 1 constituted by a microprocessor 11, a bar

code scanner 12, a key pad 13, a liquid crystal display (LCD) 14, a random access memory (RAM) 15, and a bar code data comparator 16, a lock assembly 2 consisting of a door bolt 21, an actuating device 22, a fastener 23 and a fastening controller 24, a control key 3, and a driving key 4.

**[0019]** As shown in Figs. 1 and 2, the door bolt 21 is mounted in a sliding slot 25 disposed in the lock assembly 2 on the door 5. There are a plurality of slots 211 spacedly formed at the bottom of the door bolt 21. The actuating device 22 has a key hole 221 extending along its length direction thereof for inserting the driving key 4 therein and has a ring groove 222 formed along the periphery at one end thereof, in which an aperture 223 is formed for engaging the fastener 23. In addition, there are a plurality of toothed structures 224 formed along the periphery at the other end of the actuating device relative to the ring groove 222 for being engaged with the plurality of slots 211 of the door bolt 21. After the driving key is inserted into the key hole 221, the actuating device 22 is rotated to drive the door bolt 21 to slide in the sliding slot 25 through the engagement of the toothed structures 224 and slots 211 such that the outer end of the door bolt 21 can be extended into the cotter hole 6 of the door frame 6 to lock the door. In addition, the actuating device 22 has a scanning opening 225 formed on one side thereof in order to allow the bar code scanner 12 to read the bar code attached on one side of the driving key 4 (not shown).

**[0020]** The bar code scanner 12, the key pad 13, the LCD 14, the RAM 15, and the bar code data comparator 16 are electrically connected to the microprocessor 11, respectively, as shown in Fig. 3. After the control key 3 is inserted into the key hole 17, the bar code 31 attached on one side of the control key 3 can be read by the bar code scanner 12 through a scanning opening 171 formed on the wall of key hole 17. The optical signal of the bar code 31 is converted to a digital signal by the bar code scanner 12 and then the digital signal is sent to the bar code data comparator 16 via the microprocessor 11. The digital signal is compared with the corresponding valid bar code data stored in the memory 15 in the bar code data comparator 16. If the digital signal is valid, the microprocessor 11 will send out a signal to turn on the power of the key pad 13 so as to allow the user to change the bar code data stored in the memory 15 through the key pad 13.

**[0021]** As shown in Fig. 4, the operating procedure of the electronic lock system of the present invention includes the following steps:

1. inserting the driving key 4 into the key hole 221;
2. scanning the bar code attached on the driving key 4 by the bar code scanner 12 through the scanning opening 225;
3. converting the scanned optical signal of the bar code to a digital signal to be read by the microprocessor 11 and sending the digital signal to the bar

code data comparator 16;

4. comparing the digital signal of the bar code to the bar code data stored in the memory 15;

5. outputting a control signal generated from the microprocessor 11 to the fastening controller 24 (as this can be any prior device its detailed description is omitted), wherein if the digital signal is valid, the fastener 23 is disengaged from the aperture 223 such that the actuating device 22 is separated from the fastener 23;

6. rotating the driving key 4 for allowing the toothed structures 224 to drive the door bolt 21 away from the direction of the cotter hole 6', thereby releasing the locked state of the door lock. Thus, if the data of the bar code attached on the driving key 4 is not stored in the memory 15, the fastener 23 will not be disengaged from the aperture 223, and the locked state of the door bolt 21 will not be released by using the driving key 4 to rotate the actuating device 22.

**[0022]** Furthermore, the embodiment of the present invention also includes a timer 18 and an alarm 19 (prior art) as shown in Fig. 3. The timer 18 begins counting the time immediately after the driving key 4 is inserted into the key hole 221 (Step 7 in Fig. 4). When the predetermined time is up and the driving key 4 inserted into the key hole 221 still can not actuate the fastening controller 24 (Step 8 in Fig. 4), the timer 18 will generate an alarm signal for triggering the alarm 19 (Step 10 in Fig. 4). If the fastening controller 24 is actuated before the predetermined time set in the timer 18 is finished, the counting step of the timer 18 will stop (Step 9 in Fig. 4).

## Claims

### 1. An electronic lock system comprising:

a recognition device including a microprocessor, a scanner, an input element, a display unit, a memory device, and a data-scanning comparator, wherein said scanner, said input element, said display unit, said memory device, and said data-scanning comparator are electrically connected to said microprocessor, respectively;

a lock assembly having a lock operator for selectively locking/unlocking said lock system, an actuating device for driving said lock operator, a fastener for engaging with said actuating device, and a fastening controller;

a controlling device having a first marker, wherein said microprocessor will generate a signal for allowing a user to change valid data stored in said memory device corresponding to said first marker after scanning said first marker; and

a driving device having a second marker which is scanned by said scanner for obtaining a

scanned data to be compared with said corresponding valid data stored in said memory device after inserting said driving device into said actuating device, wherein if said scanned data is valid, said microprocessor will generate a control signal to be sent to said fastening controller for disengaging said fastener from an aperture of said actuating device.

2. The system according to claim 1 wherein said first and second markers are bar codes, respectively.

3. The system according to claim 2 wherein said scanner is a bar code scanner.

4. The system according to any of claims 1 to 3 wherein said input element is a key pad.

5. The system according to any of claims 1 to 4 wherein said memory device is a random access memory for storing said scanned data of said first marker.

6. The system according to any of claims 1 to 5 wherein said display unit is a liquid crystal display.

7. The system according to any of claims 1 to 6 wherein said lock operator is constituted of a door bolt, a sliding slot for allowing said door bolt to slide therein, and a resilient element outwardly urging against said door bolt for keeping said lock bolt extending into a cotter hole disposed on said door frame.

8. The system according to claim 7 wherein said resilient element is an elastic spring.

9. The system according to claim 7 or claim 8 wherein said door bolt has a plurality of continuously spacedly disposed slots at the bottom thereof.

10. The system according to claim 9 wherein said actuating device has a plurality of toothed structures disposed along a periphery at one end thereof to be engaged with said slots of said door bolt so as to reciprocate said door bolt when driving said actuating device.

11. The system according to any of the preceding claims wherein said recognition device further includes a timer and an alarm.

12. A door security system comprising an electronic lock system according to any of the preceding claims, wherein the lock assembly has a door bolt, and an actuating device for driving said door bolt with which to reciprocate, the fastener engaging with said actuating device, and the fastening controller engaging/disengaging said fastener with/from said actuating device;

the controlling device comprises a control key,  
and the driving device comprises a driving key.

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FIG. 1

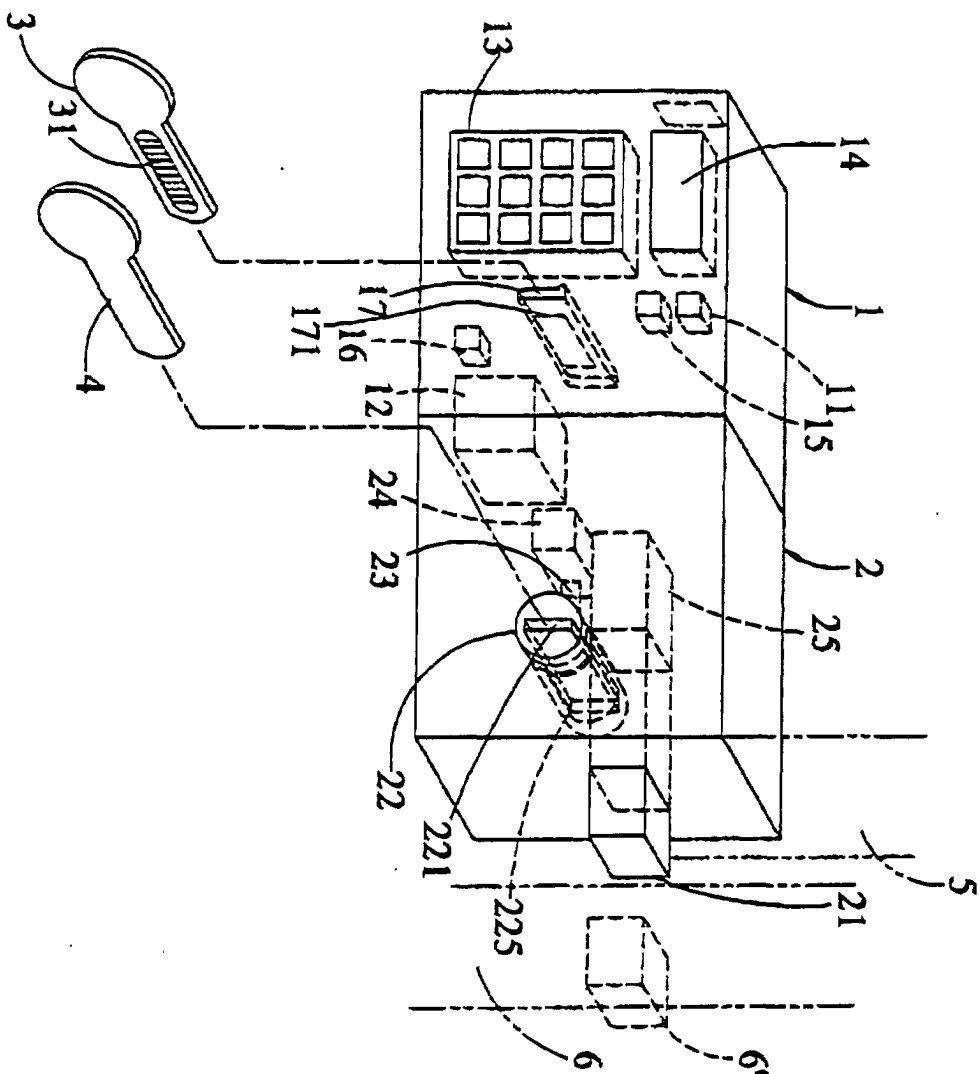
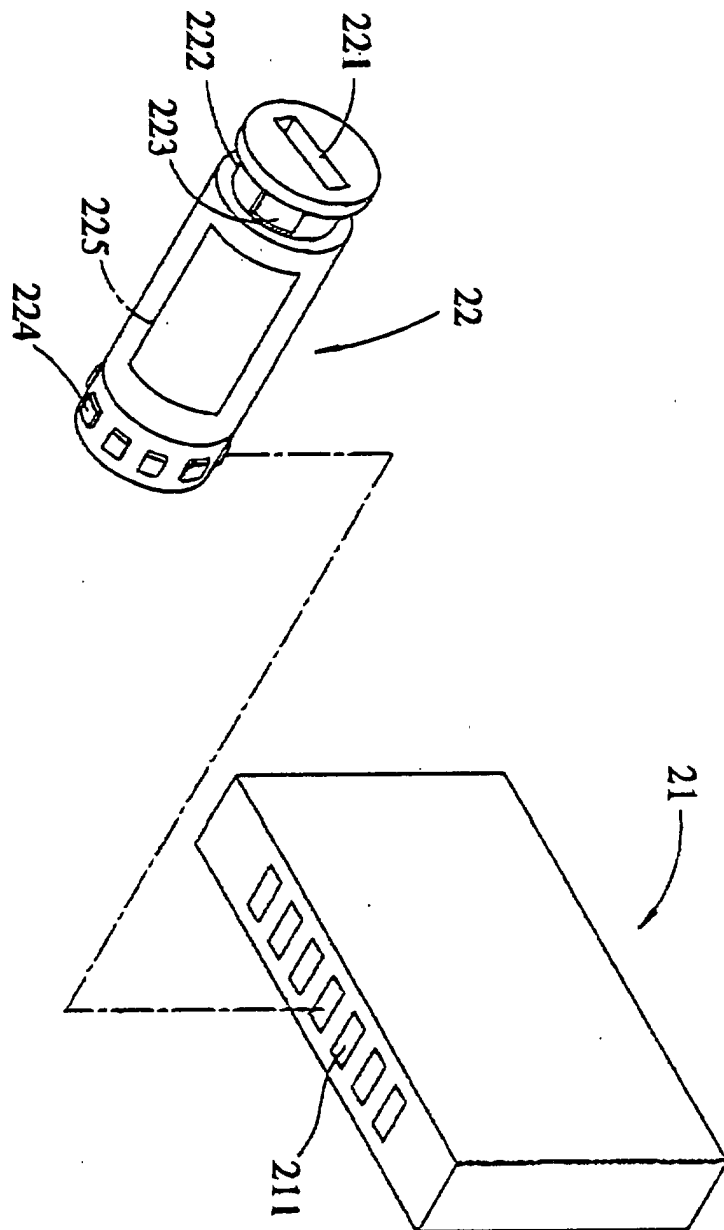


FIG. 2



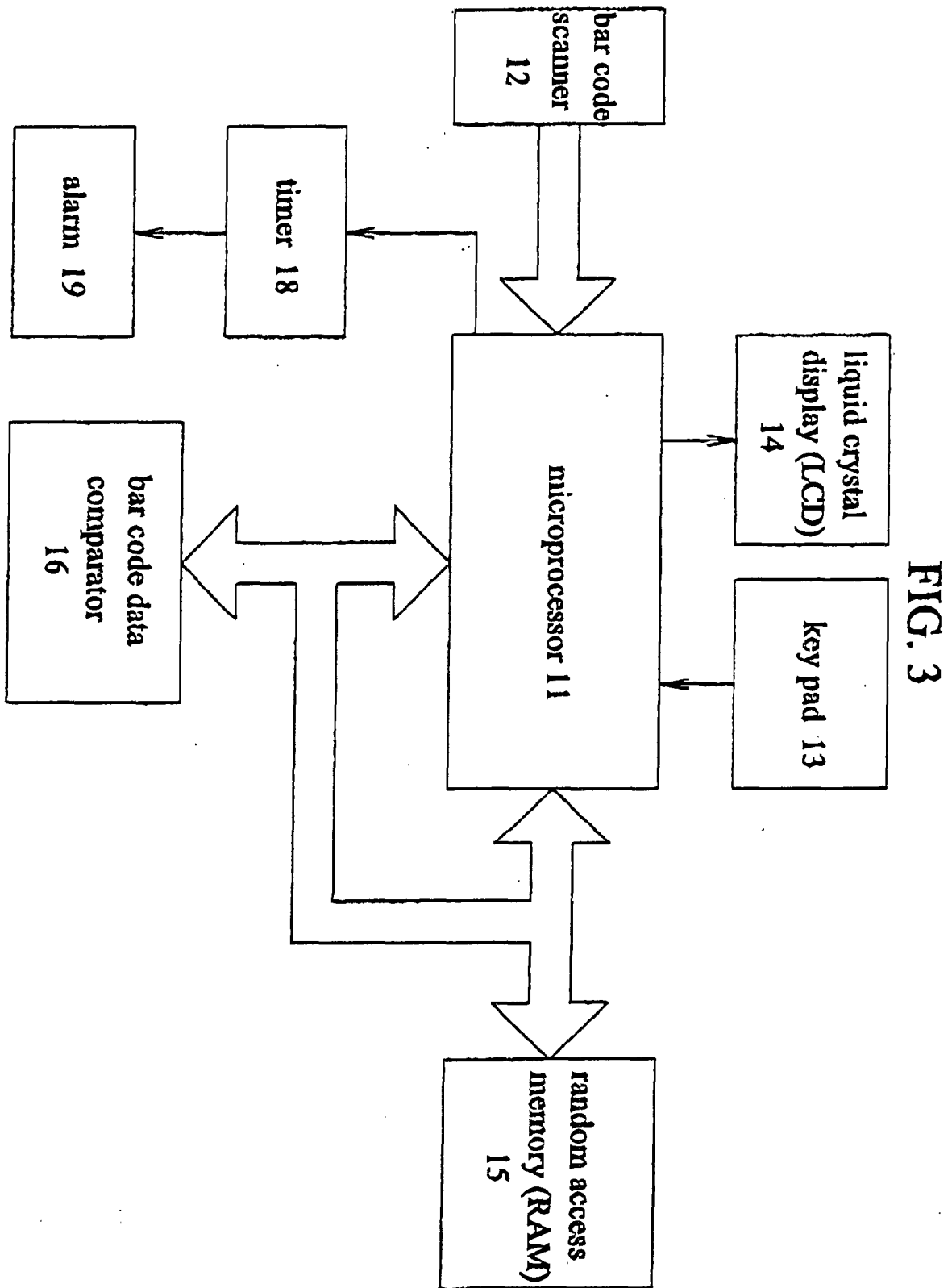
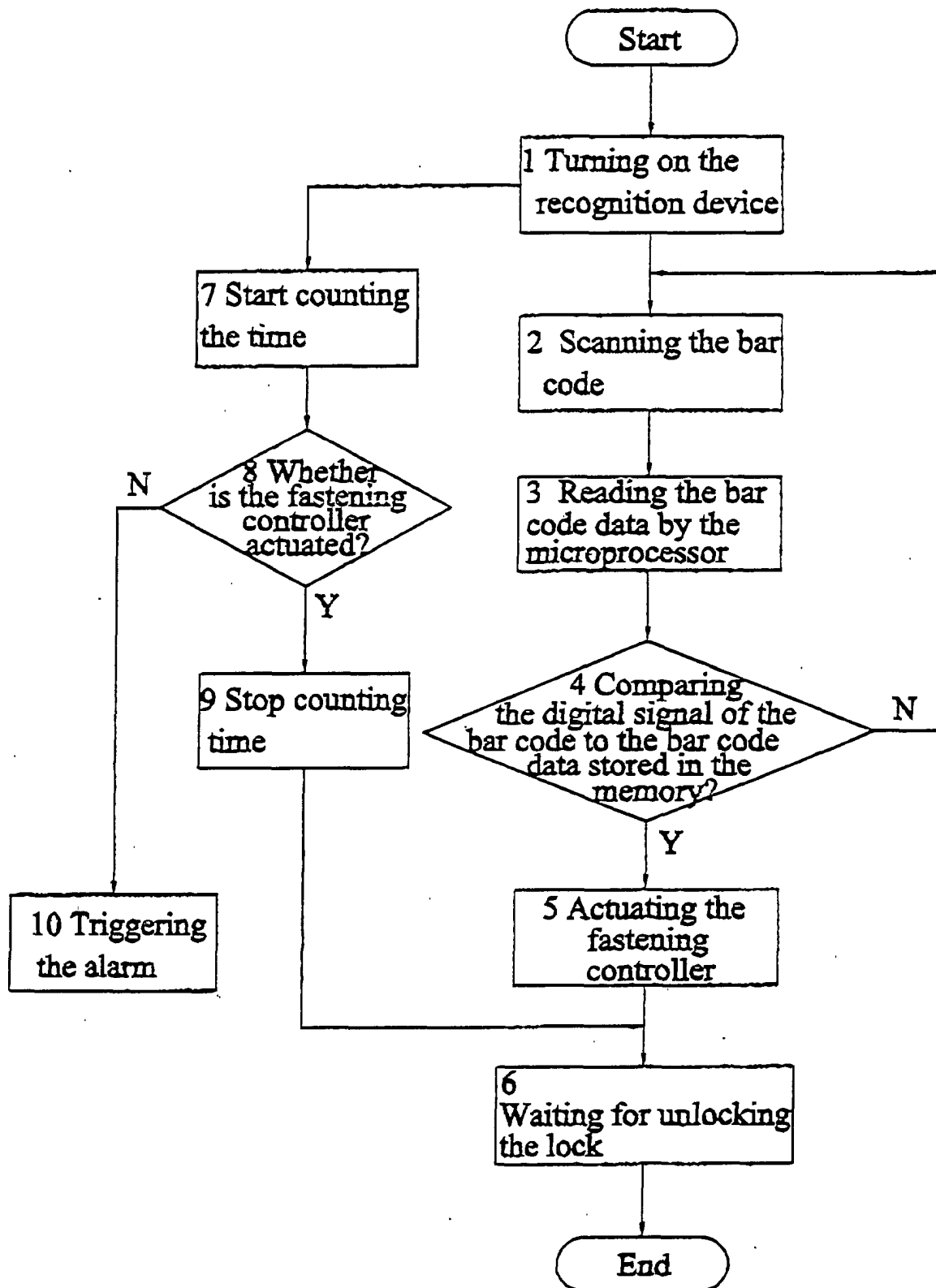


FIG. 4





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Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                   |                                  |                                              |
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