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(54) **ELECTRONIC LOCK AND METHOD FOR ACCESSING THE SAME**

(57) A electronic lock includes a locking block (22), a latch member (31), a rotary seat (4), a control module (5) mounted to the rotary seat (4), and a position-sensing unit (6) mounted to the rotary seat (4), and output signals upon rotation of the rotary seat (4). The control module (5) is configured to receive the output from the position-sensing unit (6) to thereby compose a string, and then compares the composed string with a built-in string. When the composed string matches the built-in string, the control module (5) sending an engaging command for moving the latch member (31) to engage the locking block (22).

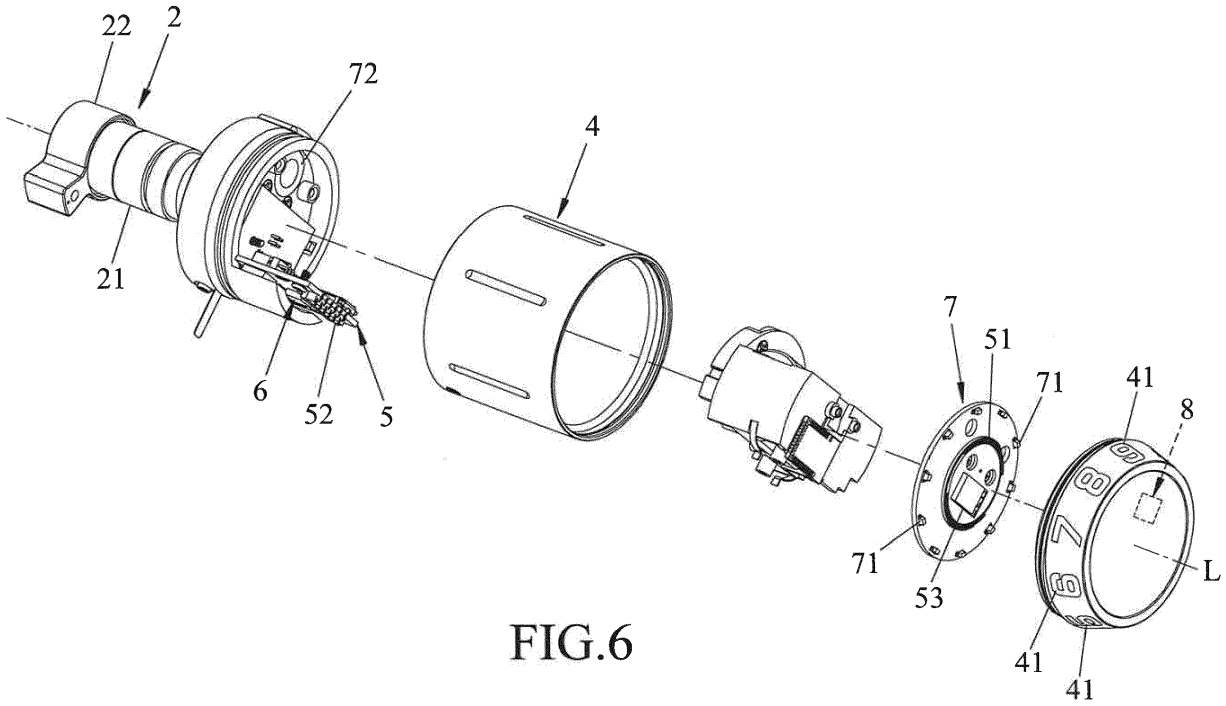

FIG.6

EP 3 751 078 A1

Description

[0001] The disclosure relates to an electronic lock, and more particularly to an electronic lock and a method for accessing the electronic lock.

[0002] Referring to Figures 1 and 2, a conventional electronic lock 1 disclosed in Chinese Patent Publication No. 103670037B includes an inner handle seat 11, an outer handle seat 12, a lock core unit 13, two latching units 14, a sensing unit 15 and a driving unit 16. The lock core unit 13 is disposed between the inner handle seat 11 and the outer handle seat 12, and includes a core axle 131 that extends in a core direction (D), a core tube 132 that surrounds the core axle 131, and a locking block 133 that is co-movably mounted to the core tube 132 and that is for engaging a locking groove (not shown). The core tube 132 has two latch grooves 134 at two opposite ends thereof that are respectively proximate to the inner handle seat 11 and the outer handle seat 12. The latching units 14 are respectively mounted to the inner handle seat 11 and the outer handle seat 12. Each of the latching units 14 includes a latch member 141 that rotates along with the corresponding inner and outer handle seats 11, 12 and that is movable relative to the corresponding inner and outer handle seats 11, 12 in the core direction (D) . The latch members 141 of the latching units 14 are respectively and co-movably mounted to two opposite ends of the core axle 131. The sensing unit 15 includes an inner sensor 151 that is mounted in the inner handle seat 11, and an outer sensor 152 that is mounted in the outer handle seat 12. The driving unit 16 includes a driving motor 160 that is disposed in the inner handle seat 11, and a resilient member 162 that has two opposite ends respectively connected to an output shaft 161 of the driving motor 160 and one of the latch members 141 of the latching units 14. When a sensing card (not shown) approaches one of the inner and outer handle seats 11, 12, the driving motor 160 drives the corresponding one of the latch members 141 of the latching units 14 to engage the corresponding latch groove 134 of the core tube 132, such that the locking block 133 is operable by turning the one of the inner and outer handle seats 11, 12. In addition, the outer handle seat 12 is provided with a mechanical locking module 17. The mechanical locking module 17 is operable by a key (not shown) to move the corresponding latch member 141 to engage the corresponding latch groove 134 of the core tube 132, so as to permit the locking block 133 to be operated by turning the outer handle seat 12.

[0003] However, the conventional electronic lock 1 is not accessible when both of the sensing card and the key are not available.

[0004] Therefore, an object of the disclosure is to provide an electronic lock that can alleviate the drawback of the prior art.

[0005] According to the disclosure, the electronic lock includes a lock core unit, a driving unit, a rotary seat, an indication unit, a control module and position-sensing unit. The lock core unit is mounted to the door leaf along an axial line, and includes a locking block that is rotatable about the axial line. The driving unit includes a latch member that is operable to removably engage the locking block, and an actuator that is operable to drive the latch member to move along the axial line. The latch member is movable along the axial line relative to the locking block between an engaging position and a disengaging position. The latch member engages the locking block when the latch member is at the engaging position. The latch member is disengaged from the locking block when the latch member is at the disengaging position. The rotary seat is rotatable about the axial line, and is disposed on the door leaf for being gripped by a user. The actuator is mounted to the rotary seat, and is rotatable along with the rotary seat. The rotary seat is able to drive rotation of the locking block via the driving unit when the latch member is at the engaging position. The rotary seat is unable to drive rotation of the locking block when the latch member is at the disengaging position. The indication unit is disposed on the rotary seat, and includes a plurality of indication regions that are disposed about the axial line and that are disposed on an outer surface of the rotary seat. The indication regions are in the form of characters, and respectively correspond to different angular positions of the rotary seat. The control module is mounted to the rotary seat, and is electrically coupled to the driving unit for controlling the actuator of the driving unit. The position-sensing unit is disposed on the rotary seat for sensing the angular position of the rotary seat, and is electrically coupled to the control module to output a position signal to the control module upon sensing the angular position of the rotary seat. The control module is configured to receive the output from the position-sensing unit to thereby compose a string, and then compares the composed string with a built-in string. When the composed string matches the built-in string, the control module sends an engaging command to the driving unit for moving the latch member to the engaging position.

[0006] Another object of the disclosure is to provide a method for accessing an electronic lock that can alleviate the drawback of the prior art.

[0007] According to the disclosure, the method is for accessing the abovementioned electronic lock, and includes steps of: a) repeatedly turning the rotary seat to repeatedly output, by the position-sensing unit, characters to the control module; b) stopping the control module from receiving the outputs from the position-sensing unit after a predetermined amount of the outputs from the position-sensing unit has been received, and determining, by the control module, the composed string of characters by sequentially arranging the received outputs from the position-sensing unit; and c) comparing, by the control module, the composed string of characters with the built-in string of characters. When it is determined that the composed string matches the built-in string, the control module commands the indication unit to generate a success indication, and sends the engaging command

to the driving unit to move the latch member to the engaging position. When it is determined that the composed string does not match the built-in string, the control module commands the indication unit to generate a failure indication.

[0008] Other features and advantages of the disclosure will become apparent in the following detailed description of the embodiment with reference to the accompanying drawings, of which:

Figure 1 is an exploded perspective view illustrating a conventional electronic lock disclosed in Chinese Patent Publication No. 103670037B;
Figure 2 is a sectional view illustrating the conventional electronic lock;
Figure 3 is a perspective view illustrating an embodiment of the electronic lock according to the disclosure being mounted to a door leaf, and being accessed using a sensing card;
Figure 4 is a perspective view illustrating the embodiment;
Figure 5 is a partly exploded perspective view illustrating the embodiment;
Figure 6 is another partly exploded perspective view illustrating the embodiment;
Figure 7 is still another partly exploded perspective view illustrating the embodiment;
Figure 8 is side view illustrating a driving unit of the embodiment;
Figure 9 is a fragmentary sectional view illustrating a latch member of the driving unit at an engaging position;
Figure 10 is another fragmentary sectional view illustrating the latch member at a disengaging position;
Figure 11 is a block diagram of the embodiment;
Figure 12 is a perspective view illustrating the embodiment being accessed using a mobile device;
Figure 13 is a perspective view illustrating the embodiment being switch into an active state;
Figure 14 is a perspective view illustrating the embodiment being accessed by turning a rotary seat thereof; and
Figure 15 is a flowchart illustrating steps of a method for accessing the electronic lock according to the disclosure.

[0009] Before the disclosure is described in greater detail, it should be noted that where considered appropriate, reference numerals or terminal portions of reference numerals have been repeated among the figures to indicate corresponding or analogous elements, which may optionally have similar characteristics.

[0010] Referring to Figures 3 to 6, an embodiment of the electronic lock according to the disclosure is adapted to be mounted to a door leaf 100, and is accessible by a sensing card 200. The sensing card 200 has a sensing tag 201 that stores identification data therein.

[0011] The electronic lock includes a lock core unit 2, a driving unit 3, a rotary seat 4, a control module 5, a position-sensing unit 6, an indication unit 7 and an awaking unit 8.

[0012] The lock core unit 2 is mounted to the door leaf 100 along an axial line (L), and includes a core tube 21 that extends along the axial line (L), and a locking block 22 that is located at one side of the core tube 21 and that is rotatable about the axial line (L). The locking block 22 has two engaging grooves 221 (see Figure 5) that are formed in an inner surrounding surface of the locking block 22 and that are diametrically opposite to each other.

[0013] Referring to Figures 5 and 7 to 10, the driving unit 3 is disposed in the core tube 21, and includes a latch member 31 that is operable to removably engage the engaging grooves 221 of the locking block 22, an actuator 32 (see Figure 7) that is operable to drive the latch member 31 to move along the axial line (L), and a resilient member 33 (see Figure 8). The actuator 32 has an output shaft 321 that extends toward the latch member 31 and that is rotatable about the axial line (L). The resilient member 33 is disposed between the latch member 31 and the actuator 32, and has two opposite ends respectively connected to the latch member 31 and the output shaft 321 of the actuator 32, such that rotation of the output shaft 321 drives the latch member 31 to move along the axial line (L) relative to the locking block 22 between an engaging position (see Figure 9) and a disengaging position (see Figure 10). When the latch member 31 is at the engaging position, the resilient member 33 is stretched, and the latch member 31 engages the engaging grooves 221 of the locking block 22 such that the locking block 22 is co-rotatable with the latch member 31. When the latch member 31 is at the disengaging position, the resilient member 33 is contracted, and the latch member 31 is separated from the engaging grooves 221 of the locking block 22 such that the locking block 22 is not driven by rotation of the latch member 31. In one embodiment, the output shaft 321 of the actuator 32 is configured as a worm shaft.

[0014] The rotary seat 4 surrounds the axial line (L), and is rotatable about the axial line (L) . The rotary seat 4 is connected to the core tube 21, and is disposed on the door leaf 100 (see Figure 3) for being gripped by a user. When the latch member 31 is at the engaging position, rotation of the rotary seat 4 drives the locking block 22 to rotate for disengaging the locking block 22 from a locking groove (not shown) formed in a door frame. When the latch member 31 is at the disengaging position, the rotary seat 4 is configured not to drive movement of the locking block 22, so that the door leaf 100 cannot be opened. In one embodiment, the actuator 32 is co-rotatably mounted to the rotary seat 4.

[0015] Referring to Figures 5, 6, 11 and 12, the control module 5 is disposed in the rotary seat 4, and is configured to send an engaging command to the driving unit 3 for moving the latch member 31 to the engaging position. In one embodiment, the electronic lock is further able to

communicate with a mobile device 300, such as a smartphone. The mobile device 300 is configured to emit an engaging signal to the control module 5, and the control module 5 sends the engaging command to the driving unit 3 upon receiving the engaging signal. In detail, The control module 5 includes a reading unit 51 for sensing the identification data in the sensing card 200, a processing unit 52, and a communication unit 53 for communicating with the mobile device 300. The processing unit 52 is electrically coupled to the reading unit 51, the communication unit 53 and the driving unit 3, and sends the engaging command to the driving unit 3 upon detecting the identification data in the sensing card 200 via the reading unit 51, or upon receiving the engaging signal from the mobile device 300 via the communication unit 53.

[0016] In this embodiment, the reading unit 51 communicates with the sensing card 200 by virtue of Radio Frequency Identification (RFID) technology, the sensing tag 201 is configured as an RFID tag, and the reading unit 51 is configured as an RFID reader. The communication unit 53 communicates with the mobile device 300 by virtue of Bluetooth technology. Other wireless communication technologies may be employed in a modification.

[0017] The position-sensing unit 6 is disposed on the rotary seat 4, and is electrically coupled to the processing unit 52 for detecting the angular position of the rotary seat 4. In one embodiment, the position-sensing unit 6 may be configured as an inertial measurement unit (IMU) that includes accelerometers (G-sensors) and gyroscopes.

[0018] Referring to Figures 6, 11, 13 and 14, the indication unit 7 is disposed on the rotary seat 4, and is electrically coupled to the processing unit 52. The indication unit 7 includes a plurality of indication regions 41, a plurality of LED (light-emitting diode) lamps 71 and a buzzer 72. The indication regions 41 are disposed about the axial line (L), and are disposed on an outer surface of the rotary seat 4. In this embodiment, each of the indication regions 41 is configured as a hollow structure that is formed in the rotary seat 4. In a modification, each of the indication regions 41 may be made of a light-transmissible material, and is mounted to the rotary seat 4. The indication unit 7 may further include a determination indication region 42 that is disposed between two of the indication regions 41. The determination indication region 42 is configured as a hollow structure in this embodiment, but may be made of a light-transmissible material in a modification. It should be noted that, in this embodiment, the indication regions 41 are in the form of Arabic numerals, but may be in the form of other characters in a modification. Similarly, the determination indication region 42 is in the form of the symbol "#" in this embodiment, but may be in the form of another character in a modification. The indication regions 41 and the determination indication region 42 respectively correspond to different angular positions of the rotary seat 4. The position-sensing unit 6 is configured to sense the angular position of the rotary seat 4, and then to output the character that is presented in the corresponding indication region 41 or determination indication region 42 to the processing unit 52 of the control module 5. In one embodiment, the position-sensing unit 6 may indirectly output characters to the processing unit 52. For example, the position-sensing unit 6 may output a position signal to the processing unit 52 upon sensing the angular position of the rotary seat 4, and the processing unit 52 determines a corresponding character upon the received position signal from the position-sensing unit 6.

[0019] The LED lamps 71 are disposed on the rotary seat 4, and respectively correspond in position to the indication regions 41 and the determination indication region 42 for respectively illuminating the indication regions 41 and the determination indication region 42.

[0020] The indication unit 7 is operable to generate a position indication, a success indication and a failure indication. When the processing unit 52 of the control module 5 receives the output signal from the position-sensing unit 6, the processing unit 52 commands the indication unit 7 to generate the position indication. In this embodiment, the position indication is to intermittently illuminate the corresponding indication region 41 or determination indication region 42 upon the angular position of the rotary seat 4 detected by the position-sensing unit 6.

[0021] The processing unit 52 of the control module 5 is configured to receive a sequence of outputs from the position-sensing unit 6, and to compose a string of characters by sequentially arranging the outputs from the position-sensing unit 6. The processing unit 52 then compares the composed string of characters with a built-in string of characters. When the composed string matches the built-in string, the processing unit 52 commands the indication unit 7 to generate the success indication. In this embodiment, the success indication is to intermittently illuminate all of the indication regions 41 and the determination indication region 42, and to send the engaging command to the driving unit 3 so as to move the latch member 31 to the engaging position. When the composed string does not match the built-in string, the processing unit 52 commands the indication unit 7 to generate the failure indication. In this embodiment, the failure indication is to command the buzzer 72 to generate a sound. In a modification, various indications may be generated by combining different illumination modes of the LED lamps 71 and different sounds generated by the buzzer 72.

[0022] In one embodiment, the processing unit 52 may receive a predetermined amount of the outputs from the position-sensing unit 6 to determine the composed string of characters. In a modification, the processing unit 52 keeps receiving the outputs from the position-sensing unit 6 until the character corresponding to the determination indication region 42 is received, and then determines the composed string of characters upon the received outputs from the position-sensing unit 6. The

processing unit 52 may determine the composed string of characters by other approaches.

[0023] The awaking unit 8 is disposed on the rotary seat 4, and is electrically coupled to the processing unit 52. The awaking unit 8 emits an awaking signal to the processing unit 52 upon being depressed, and the processing unit 52 then switches the position-sensing unit 6 from an idle state to an active state. The position-sensing unit 6 cannot detect the angular position of the rotary seat 4 when being in the idle state. The position-sensing unit 6 is able to detect the angular position of the rotary seat 4 when being switched into the active state, so as to permit determination of the composed string of characters for disengaging the locking block 22 from the locking groove (not shown) (i.e., for opening the door leaf 100) .

[0024] Since the electronic lock is accessible by virtue of the position-sensing unit 6, in one embodiment, the reading unit 51 of the control module 5 may be omitted.

[0025] Referring to Figures 6, 11 and 15, a method for accessing the electronic lock according to the disclosure includes steps of:

Step 91: enabling the position-sensing unit 6 by depressing the awaking unit 8, and repeatedly turning the rotary seat 4 to repeatedly output characters to the processing unit 52 by the position-sensing unit 6;

Step 92: stopping the processing unit 52 from receiving the outputs from the position-sensing unit 6 after a predetermined amount of the outputs from the position-sensing unit 6 has been received, and determining, by the processing unit 52, the composed string of characters by sequentially arranging the received outputs from the position-sensing unit 6;

Step 93: during execution of step 92, stopping the processing unit 52 from receiving outputs from the position-sensing unit 6 after receiving the character corresponding to the determination indication region 42 from the position-sensing unit 6, and determining, by the processing unit 52, the composed string of characters by sequentially arranging the received outputs from the position-sensing unit 6;

Step 94: comparing, by the processing unit 52, the composed string of characters with a built-in string of characters; and

Step 95 : commanding, by the processing unit 52, the indication unit 7 to generate the success indication when the composed string matches the built-in string, and sending the engaging command to the driving unit 3 to move the latch member 31 to the engaging position; and commanding the indication unit 7 to generate the failure indication when the composed string does not match the built-in string.

[0026] In step 91, the position-sensing unit 6 may be configured to output a character to the processing unit 52 after the rotary seat 4 has stayed at the corresponding angular position for a predetermined period of time, so as to prevent unwanted outputs therefrom. The predetermined period of time may be a second, 0.5 seconds, or other time intervals.

[0027] In step 93, the composed string of characters determined by the processing unit 52 may not include the character corresponding to the determination indication region 42.

[0028] In summary, since the electronic lock according to the disclosure is accessible via the sensing card 200 or the mobile device 300, or by repeatedly turning the rotary seat 4, the electronic lock can be operated to open the door leaf 100 when both of the sensing card 200 and the mobile device 300 are not available.

[0029] In the description above, for the purposes of explanation, numerous specific details have been set forth in order to provide a thorough understanding of the embodiment. It will be apparent, however, to one skilled in the art, that one or more other embodiments may be practiced without some of these specific details. It should also be appreciated that reference throughout this specification to "one embodiment," "an embodiment," an embodiment with an indication of an ordinal number and so forth means that a particular feature, structure, or characteristic may be included in the practice of the disclosure. It should be further appreciated that in the description, various features are sometimes grouped together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure and aiding in the understanding of various inventive aspects, and that one or more features or specific details from one embodiment may be practiced together with one or more features or specific details from another embodiment, where appropriate, in the practice of the disclosure.

Claims

1. An electronic lock adapted to be mounted to a door leaf (100), **characterized by**:

a lock core unit (2) mounted to the door leaf (100) along an axial line (L), and including a locking block (22) that is rotatable about the axial line (L);

a driving unit (3) including a latch member (31) that is operable to removably engage said locking block (22), and an actuator (32) that is operable to drive said latch member (31) to move along the axial line (L), said latch member (31) being movable along the axial line (L) relative to said locking block (22) between an engaging position and a disengaging position, said latch member (31) engaging said locking block (22) when said latch member (31) is at the engaging position, said latch member (31) being disengaged from said locking block (22) when said latch member (31) is at the disengaging position;

a rotary seat (4) rotatable about the axial line (L), and disposed on the door leaf (100) for being

gripped by a user, said actuator (32) being mounted to said rotary seat (4), and rotatable along with said rotary seat (4), said rotary seat (4) being able to drive rotation of said locking block (22) via said driving unit (3) when said latch member (31) is at the engaging position, said rotary seat (4) being unable to drive rotation of said locking block (22) when said latch member (31) is at the disengaging position;

an indication unit (7) disposed on said rotary seat (4), and including a plurality of indication regions (41) that are disposed about the axial line (L) and that are disposed on an outer surface of said rotary seat (4), said indication regions (41) being in the form of characters, and respectively corresponding to different angular positions of said rotary seat (4);

a control module (5) mounted to said rotary seat (4), and electrically coupled to said driving unit (3) for controlling said actuator (32) of said driving unit (3); and

a position-sensing unit (6) disposed on said rotary seat (4) for sensing the angular position of said rotary seat (4), and is electrically coupled to said control module (5) to output a position signal to said control module (5) upon sensing the angular position of said rotary seat (4);

wherein, said control module (5) is configured to receive the output from said position-sensing unit (6) to thereby compose a string, and then compares the composed string with a built-in string, when the composed string matches the built-in string, said control module (5) sending an engaging command to said driving unit (3) for moving said latch member (31) to the engaging position.

2. The electronic lock as claimed in claim 1, **characterized in that** said indication unit (7) is electrically coupled to said control module (5), and is operable to generate a success indication and a failure indication, said control module (5) commanding said indication unit (7) to generate the success indication when the composed string matches the built-in string, said control module (5) commanding said indication unit (7) to generate the failure indication when the composed string does not match the built-in string.

3. The electronic lock as claimed in claim 2, further **characterized in that** said indication unit (7) further includes plurality of light-emitting diode (LED) lamps (71) for respectively illuminating said indication regions (41), said control module (5) commanding said indication unit (7) to generate the position indication when said control module (5) receives the output signal from said position-sensing unit (6), the position indication being performed by intermittently illuminating the corresponding indication region (41) upon the angular position of said rotary seat (4) detected by said position-sensing unit (6), the success indication being performed by intermittently illuminating all of said indication regions (41).

4. The electronic lock as claimed in claim 1, further **characterized by** an awaking unit (8) that is disposed on said rotary seat (4), and that is electrically coupled to said control module (5), said awaking unit (8) emitting an awaking signal to said control module (5) upon being depressed, and said control module (5) then switching said position-sensing unit (6) from an idle state to an active state, said position-sensing unit (6) being unable to detect the angular position of said rotary seat (4) when being in the idle state, said position-sensing unit (6) being able to detect the angular position of said rotary seat (4) when being switched into the active state.

5. The electronic lock as claimed in claim 1, **characterized in that** said indication unit (7) further includes a determination indication region (42) that is disposed on said outer surface of said rotary seat (4), that is in the form of a character, and that corresponds to an angular position of said rotary seat (4), said control module (5) stopping receiving outputs from said position-sensing unit (6) after receiving the character corresponding to said determination indication region (42) from said position-sensing unit (6), and determining the composed string by sequentially arranging the received outputs from said position-sensing unit (6).

6. The electronic lock as claimed in claim 1 adapted to communicate with a mobile device (300) that is operable to emit an engaging signal, **characterized in that**, said control module (5) communicates with the mobile device (300), and sends the engaging command to said driving unit (3) upon receiving the engaging signal from the mobile device (300).

7. The electronic lock as claimed in claim 1, **characterized in that** said actuator(32) has a worm shaft (321) that extends toward said latch member (31) and that is rotatable about the axial line (L), said driving unit (3) further including a resilient member (33) that is configured to be stretched or contracted by rotation of the worm shaft (321), so as to move said latch member (31) relative to said locking block (22) .

8. A method for accessing the electronic lock of claim 1, **characterized by** steps of:

a) repeatedly turning the rotary seat (4) to repeatedly output, by the position-sensing unit (6), characters to the control module (5);

b) stopping the control module (5) from receiving

the outputs from the position-sensing unit (6) after a predetermined amount of the outputs from the position-sensing unit (6) has been received, and determining, by the control module (5), the composed string of characters by sequentially arranging the received outputs from the position-sensing unit (6); and

c) comparing, by the control module (5), the composed string of characters with the built-in string of characters;

wherein, when it is determined that the composed string matches the built-in string, the control module (5) commands the indication unit (7) to generate a success indication, and sends the engaging command to the driving unit (3) to move the latch member (31) to the engaging position; and

wherein, when it is determined that the composed string does not match the built-in string, the control module (5) commands the indication unit (7) to generate a failure indication.

9. The method as claimed in claim 8, further **characterized by**, before step a), a step of:

d) enabling the position-sensing unit (6) by depressing the awaking unit (8).

10. The method as claimed in claim 8, the indication unit (7) of the electronic lock further including a determination indication region (42) that is disposed on the outer surface of the rotary seat (4), that is in the form of a character, and that corresponds to an angular position of the rotary seat (4), the method being **characterized in that**:

during execution of step b), when the control module (5) receives the character corresponding to the determination indication region (42) from the position-sensing unit (6), the control module (5) stops receiving outputs from the position-sensing unit (6), and determining the composed string of characters by sequentially arranging the received outputs from the position-sensing unit (6).

Amended claims in accordance with Rule 137(2) EPC.

1. An electronic lock adapted to be mounted to a door leaf (100), comprising:

a lock core unit (2) mounted to the door leaf (100) along an axial line (L), and including a locking block (22) that is rotatable about the axial line (L);

a driving unit (3) including a latch member (31) that is operable to removably engage said locking block (22), and an actuator (32) that is operable to drive said latch member (31) to move along the axial line (L), said latch member (31) being movable along the axial line (L) relative to said locking block (22) between an engaging position and a disengaging position, said latch member (31) engaging said locking block (22) when said latch member (31) is at the engaging position, said latch member (31) being disengaged from said locking block (22) when said latch member (31) is at the disengaging position;

a rotary seat (4) rotatable about the axial line (L), and disposed on the door leaf (100) for being gripped by a user, said actuator (32) being mounted to said rotary seat (4), and rotatable along with said rotary seat (4), said rotary seat (4) being able to drive rotation of said locking block (22) via said driving unit (3) when said latch member (31) is at the engaging position, said rotary seat (4) being unable to drive rotation of said locking block (22) when said latch member (31) is at the disengaging position;

an indication unit (7) disposed on said rotary seat (4), and including a plurality of indication regions (41) that are disposed about the axial line (L) and that are disposed on an outer surface of said rotary seat (4), said indication regions (41) being in the form of characters, and respectively corresponding to different angular positions of said rotary seat (4);

a control module (5) mounted to said rotary seat (4), and electrically coupled to said driving unit (3) for controlling said actuator (32) of said driving unit (3); and

a position-sensing unit (6) disposed on said rotary seat (4) for sensing the angular position of said rotary seat (4), and electrically coupled to said control module (5) to output a position signal to said control module (5) upon sensing the angular position of said rotary seat (4);

wherein, said control module (5) is configured to receive the output from said position-sensing unit (6) to thereby compose a string, and then compares the composed string with a built-in string, when the composed string matches the built-in string, said control module (5) sending an engaging command to said driving unit (3) for moving said latch member (31) to the engaging position;

said electronic lock being **characterized by**

an awaking unit (8) that is disposed on said rotary seat (4), and that is electrically coupled to said control module (5), said awaking unit (8) emitting an awaking signal to said control module (5) upon being depressed, and said control module (5) then switching said position-sensing unit (6) from an idle state to an active state, said position-sensing unit (6) being unable to detect the angular position of said rotary seat (4) when being in the idle state, said position-sensing unit (6) being able to detect the angular position of

said rotary seat (4) when being switched into the active state;

wherein said indication unit (7) is electrically coupled to said control module (5), and is operable to generate a success indication and a failure indication, said control module (5) commanding said indication unit (7) to generate the success indication when the composed string matches the built-in string, said control module (5) commanding said indication unit (7) to generate the failure indication when the composed string does not match the built-in string; and

wherein said indication unit (7) further includes a plurality of light-emitting diode (LED) lamps (71) for respectively illuminating said indication regions (41), said control module (5) commanding said indication unit (7) to generate a position indication when said control module (5) receives the output signal from said position-sensing unit (6), the position indication being performed by intermittently illuminating the corresponding indication region (41) upon the angular position of said rotary seat (4) detected by said position-sensing unit (6), the success indication being performed by intermittently illuminating all of said indication regions (41).

2. The electronic lock as claimed in claim 1, **characterized in that** said indication unit (7) further includes a determination indication region (42) that is disposed on said outer surface of said rotary seat (4), that is in the form of a character, and that corresponds to an angular position of said rotary seat (4), said control module (5) stopping receiving outputs from said position-sensing unit (6) after receiving the character corresponding to said determination indication region (42) from said position-sensing unit (6), and determining the composed string by sequentially arranging the received outputs from said position-sensing unit (6).

3. The electronic lock as claimed in claim 1 adapted to communicate with a mobile device (300) that is operable to emit an engaging signal, **characterized in that**, said control module (5) communicates with the mobile device (300), and sends the engaging command to said driving unit (3) upon receiving the engaging signal from the mobile device (300).

4. The electronic lock as claimed in claim 1, **characterized in that** said actuator (32) has a worm shaft (321) that extends toward said latch member (31) and that is rotatable about the axial line (L), said driving unit (3) further including a resilient member (33) that is configured to be stretched or contracted by rotation of the worm shaft (321), so as to move said latch member (31) relative to said locking block (22).

5. A method for accessing the electronic lock of claim 2, comprising steps of:

a) repeatedly turning the rotary seat (4) to repeatedly output, by the position-sensing unit (6), characters to the control module (5);

b) stopping the control module (5) from receiving the outputs from the position-sensing unit (6) after a predetermined amount of the outputs from the position-sensing unit (6) has been received, and determining, by the control module (5), the composed string of characters by sequentially arranging the received outputs from the position-sensing unit (6); and

c) comparing, by the control module (5), the composed string of characters with the built-in string of characters;

wherein, when it is determined that the composed string matches the built-in string, the control module (5) commands the indication unit (7) to generate the success indication, and sends the engaging command to the driving unit (3) to move the latch member (31) to the engaging position; and

wherein, when it is determined that the composed string does not match the built-in string, the control module (5) commands the indication unit (7) to generate the failure indication;

said method being **characterized by**, before step a), a step of

d) enabling the position-sensing unit (6) by depressing the awaking unit (8);

wherein, during execution of step b), when the control module (5) receives the character corresponding to the determination indication region (42) from the position-sensing unit (6), the control module (5) stops receiving outputs from the position-sensing unit (6), and determining the composed string of characters by sequentially arranging the received outputs from the position-sensing unit (6).

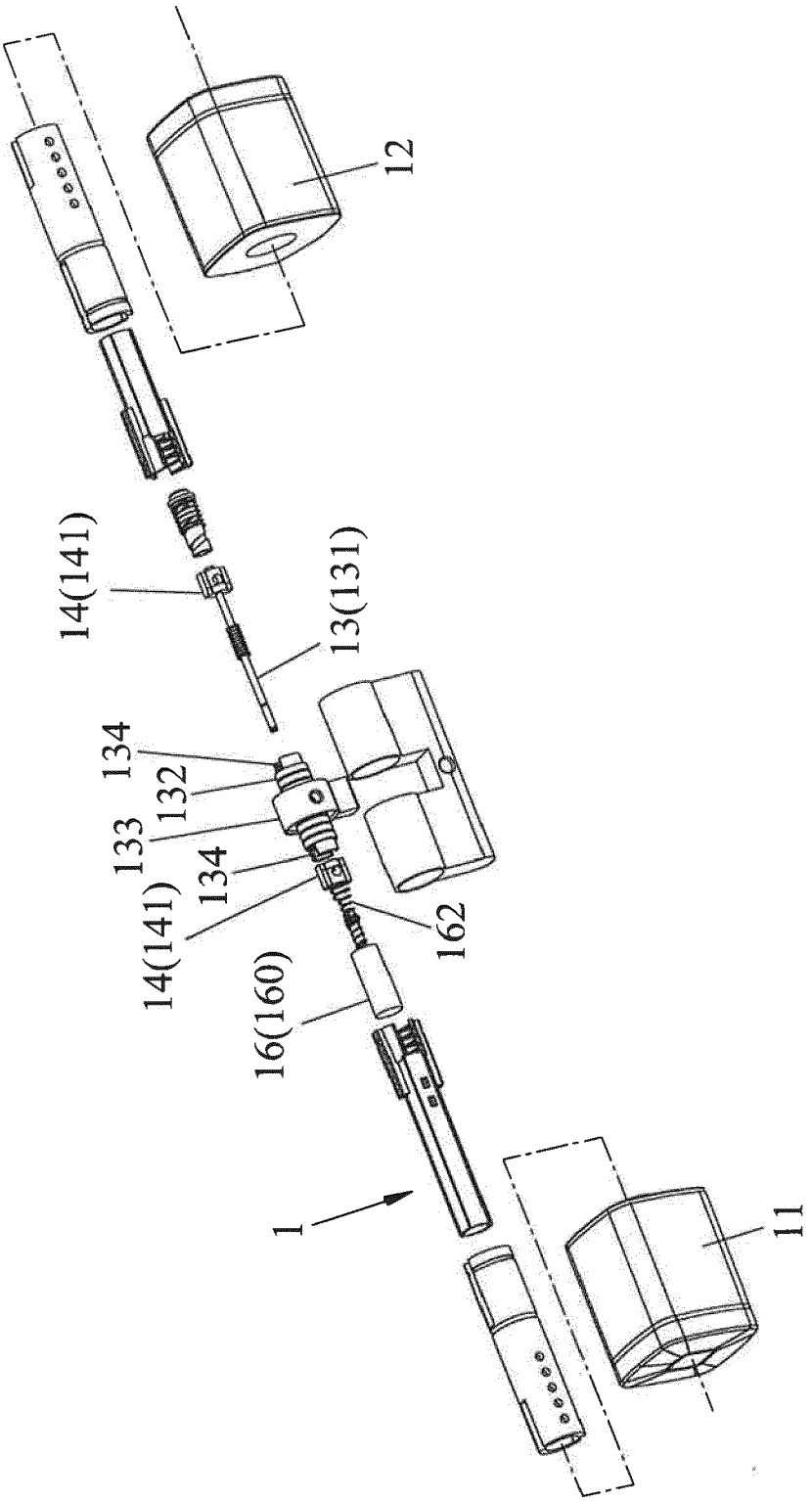

FIG.1
PRIOR ART

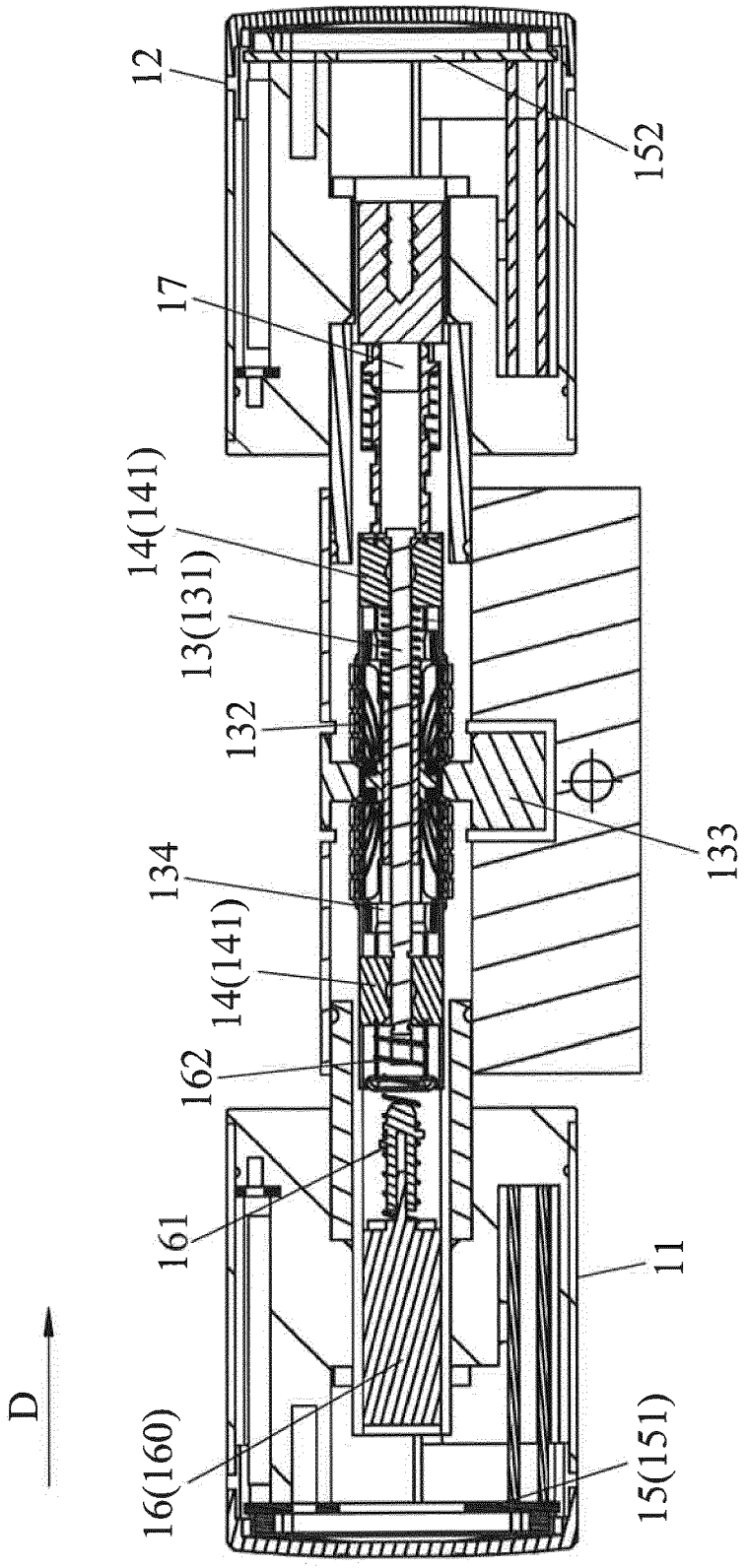

FIG.2
PRIOR ART

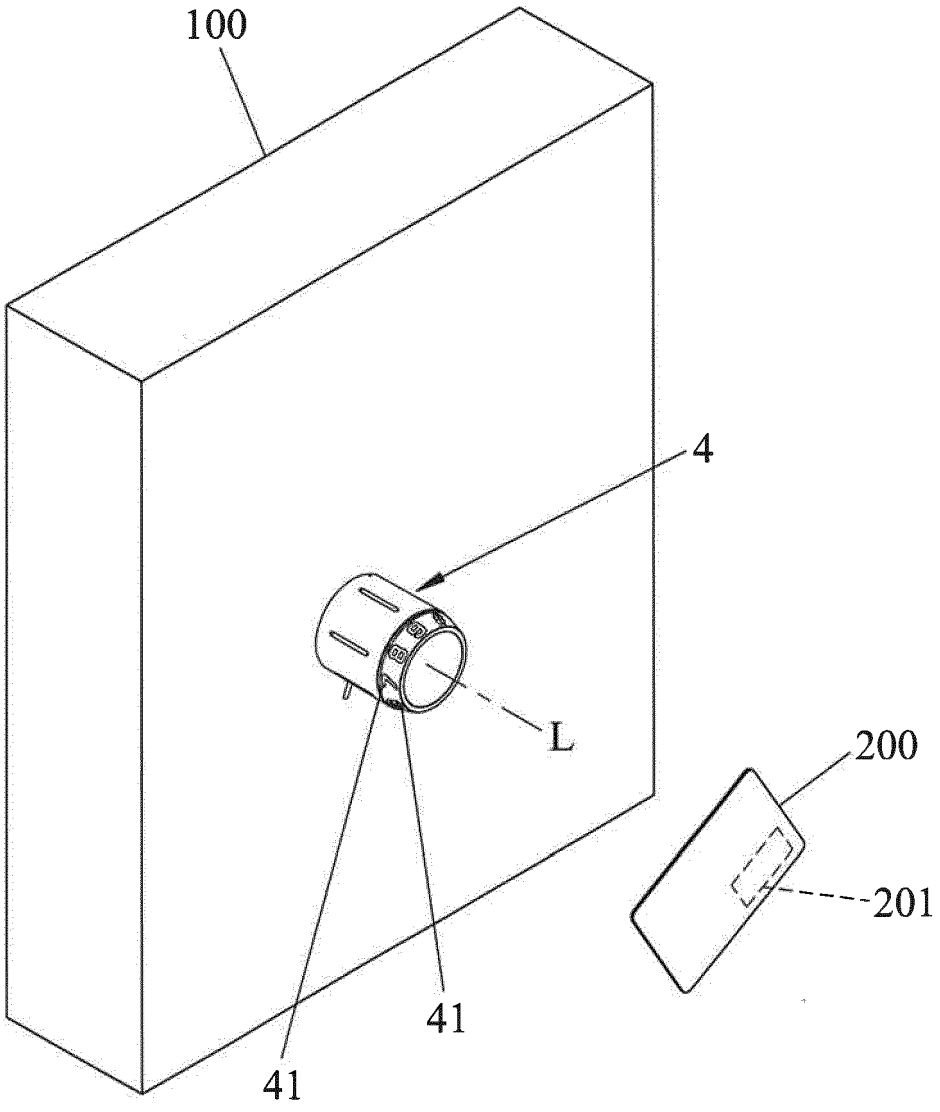

FIG.3

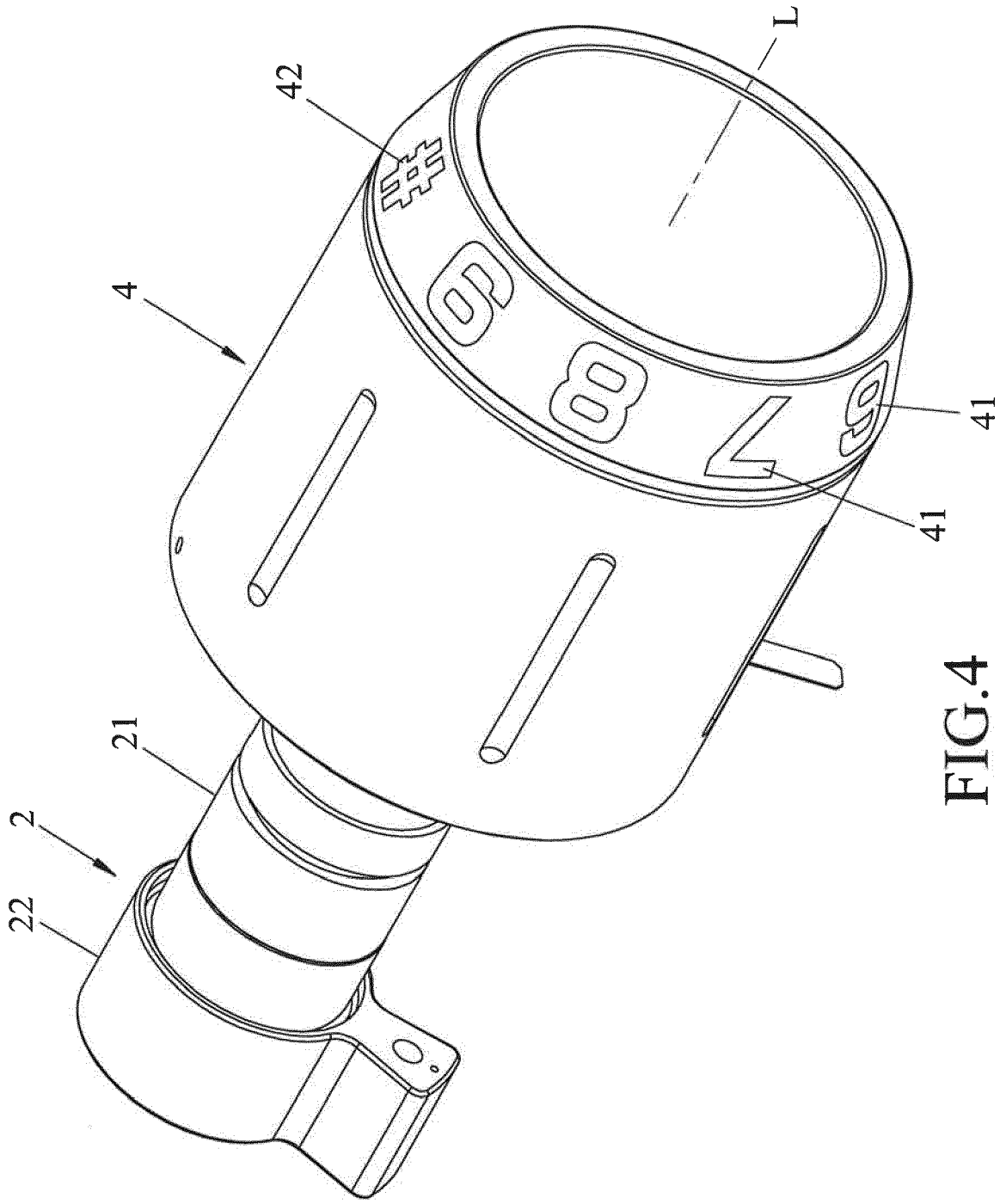

FIG.4

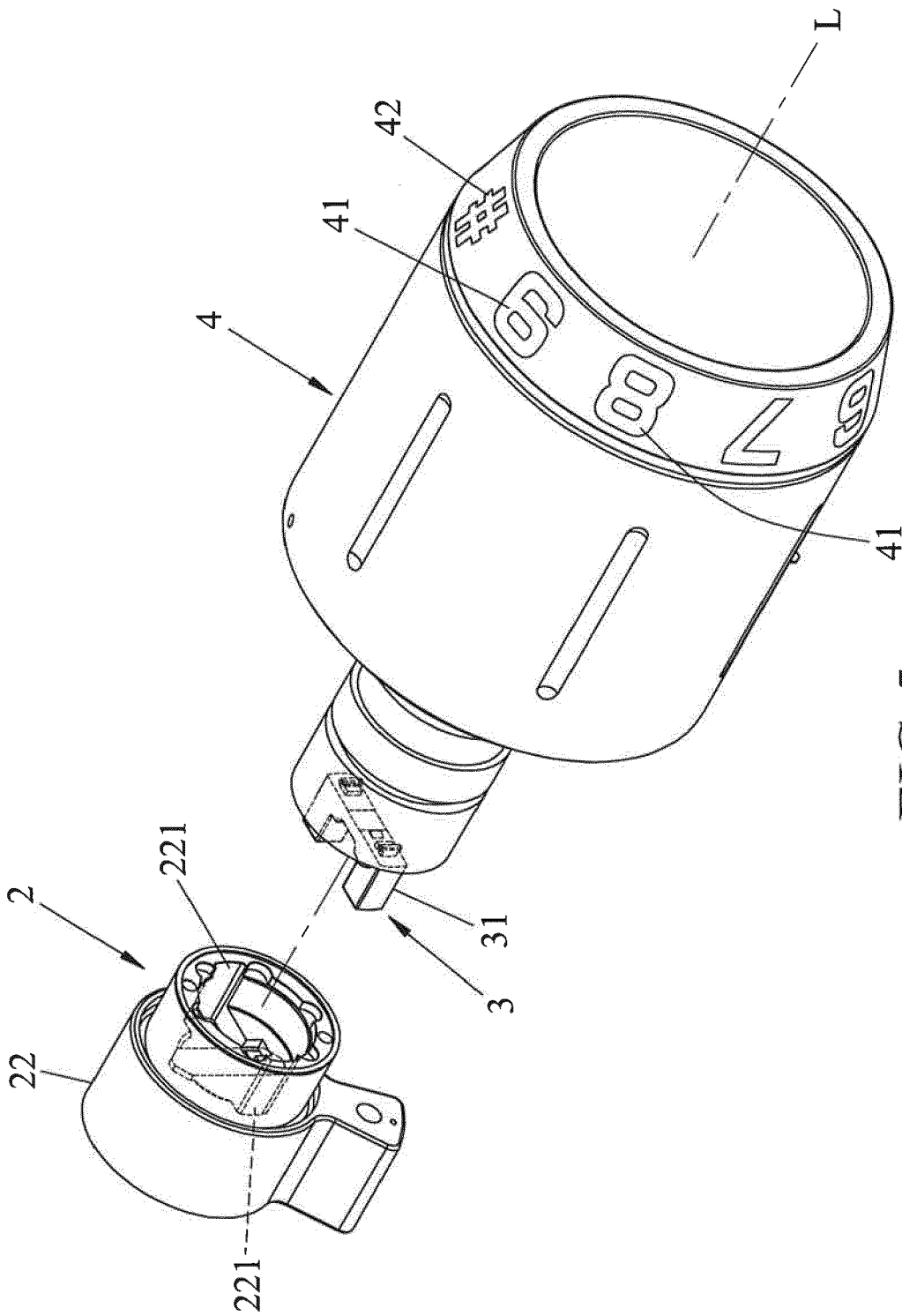

FIG.5

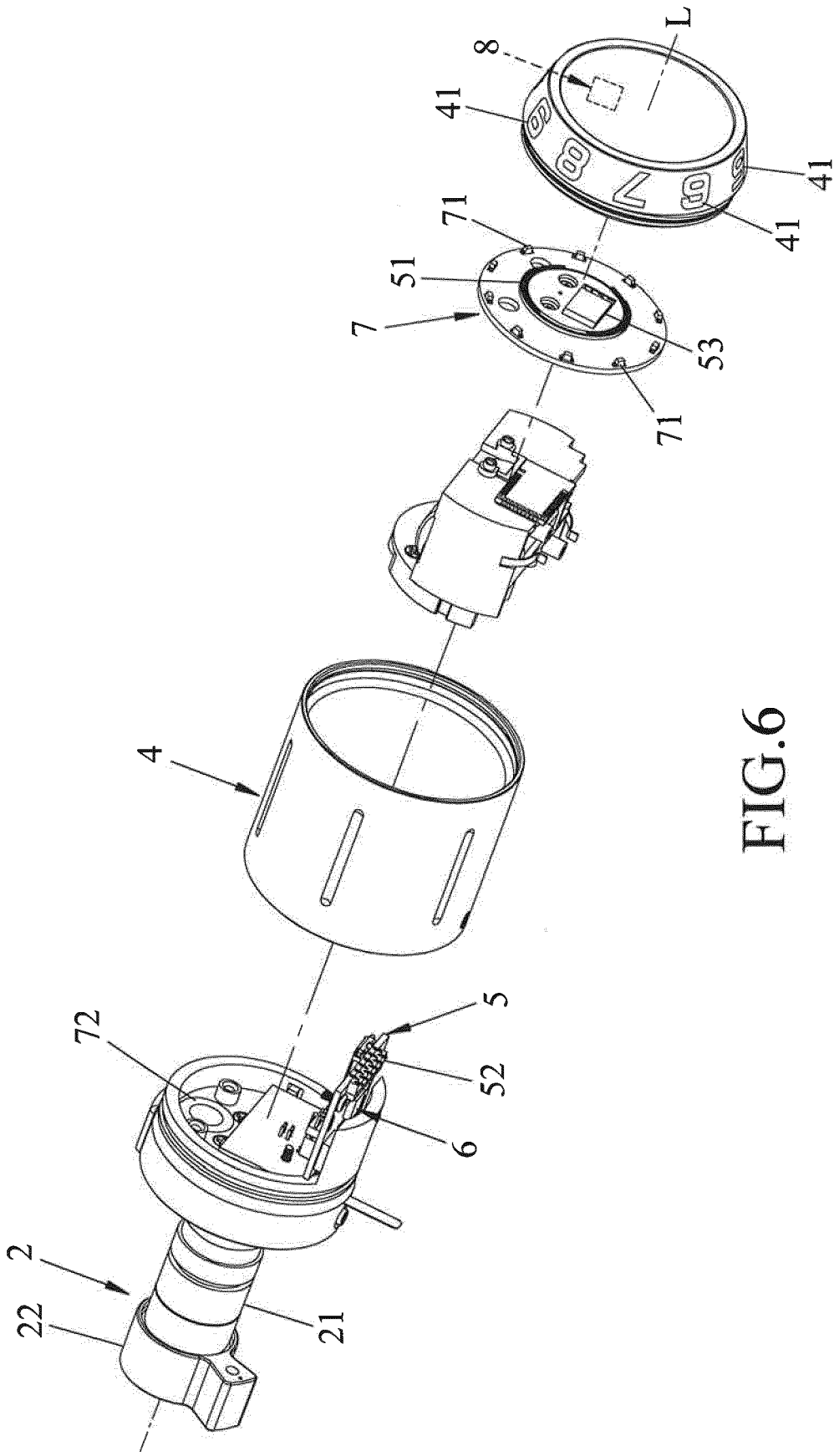

FIG.6

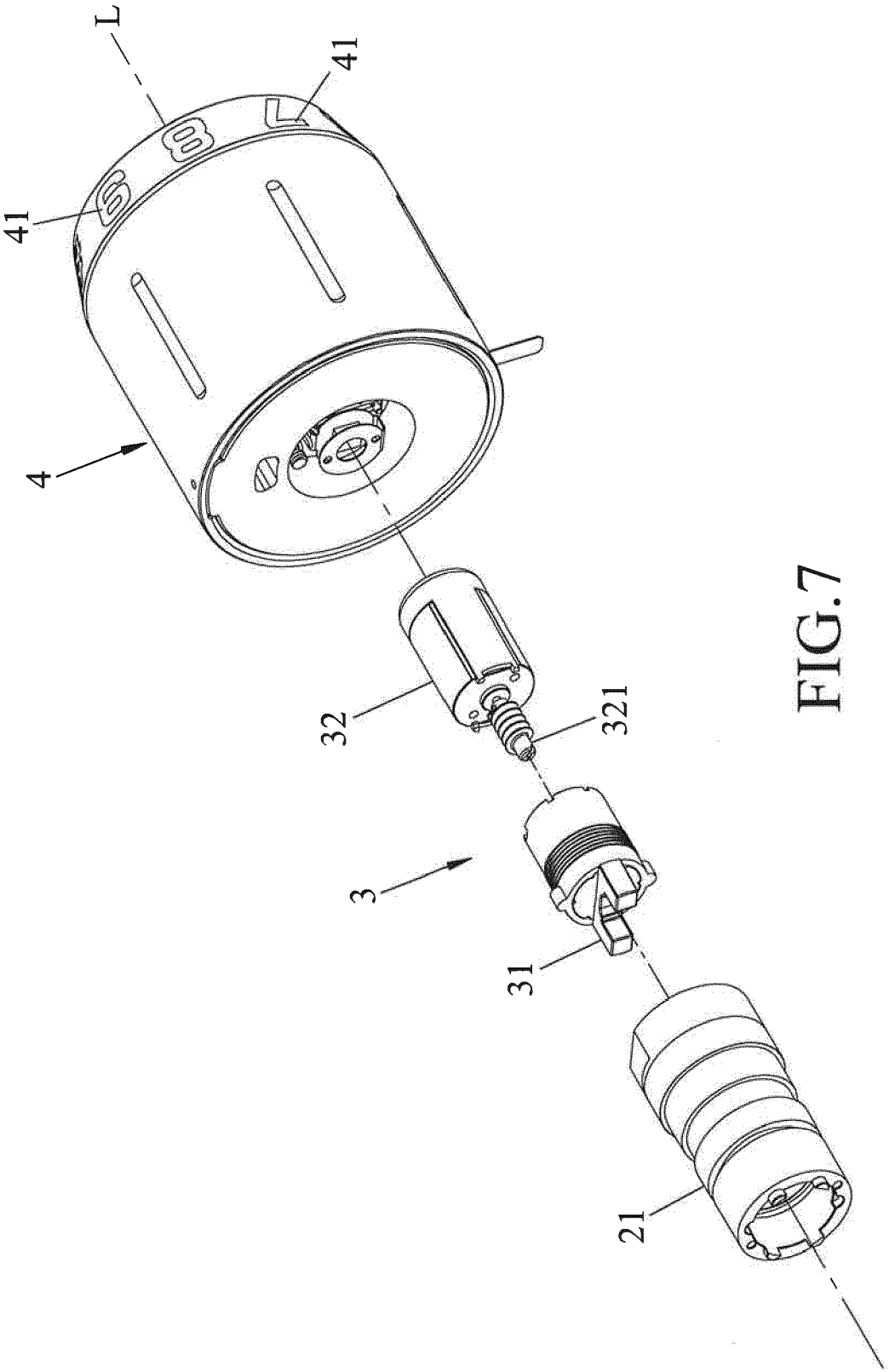

FIG.7

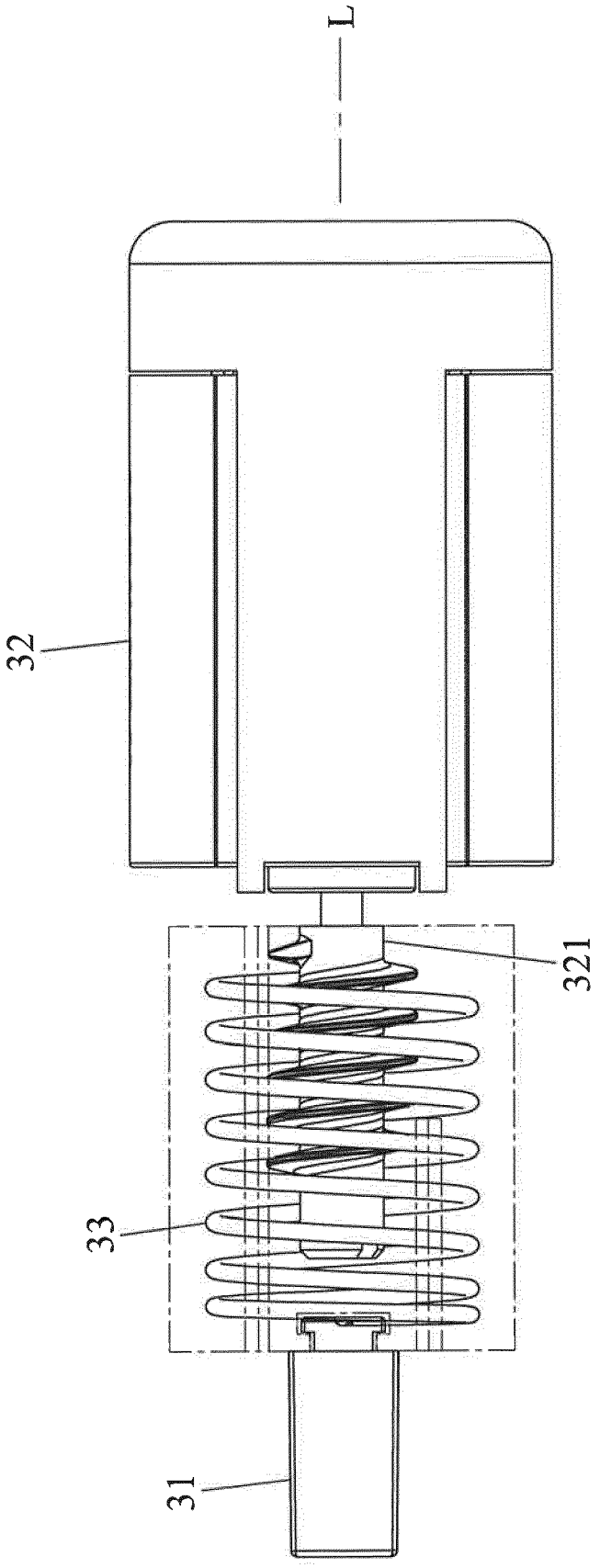

FIG.8

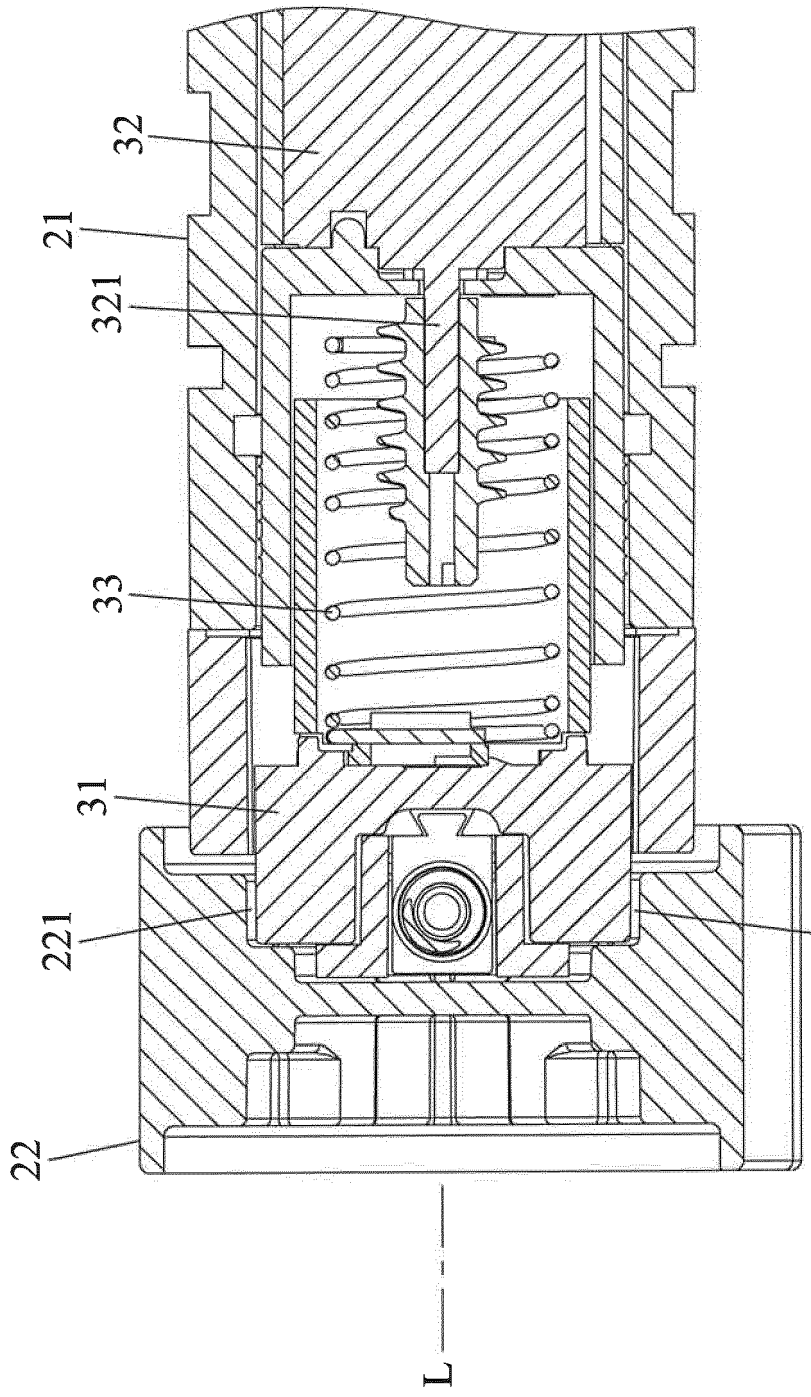

FIG.9

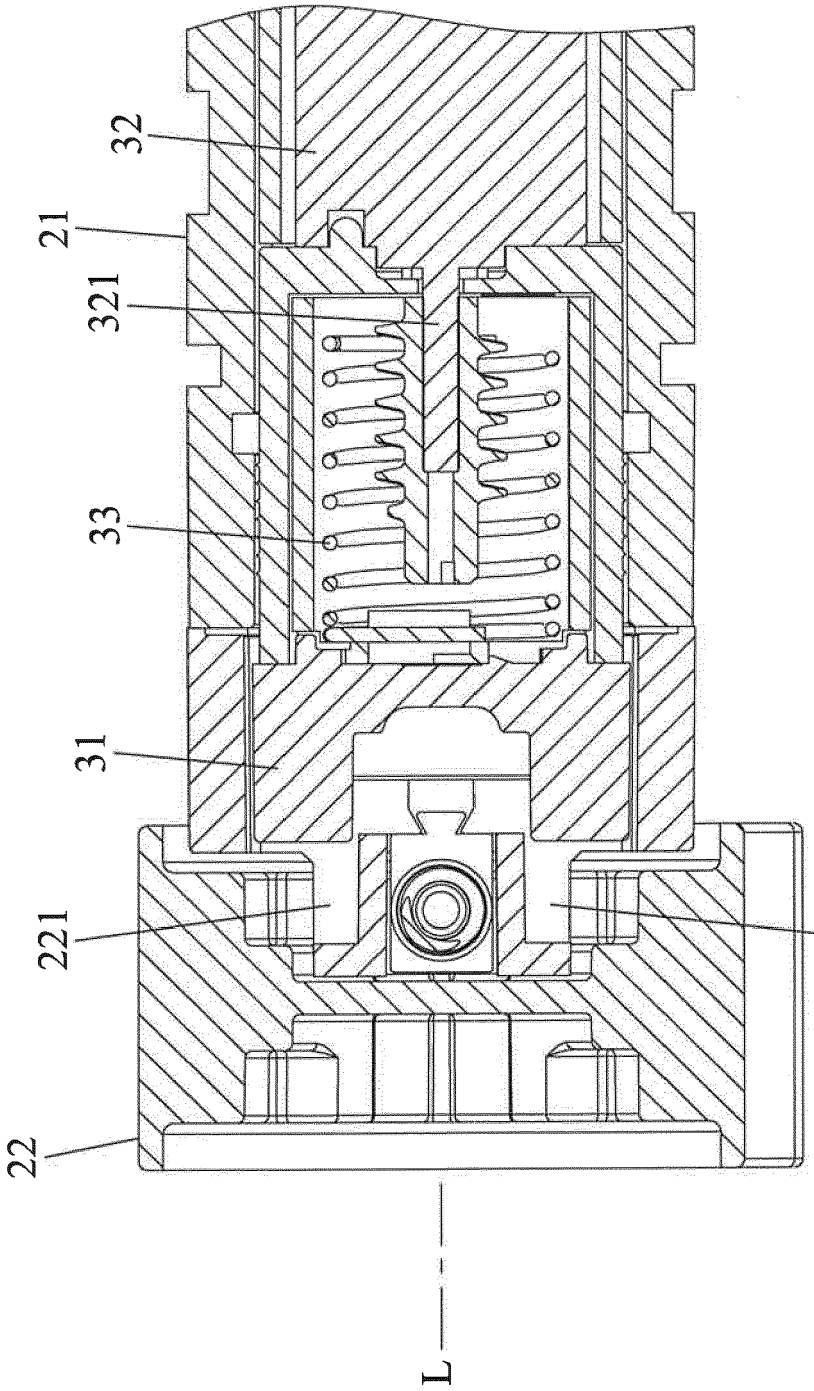

FIG.10

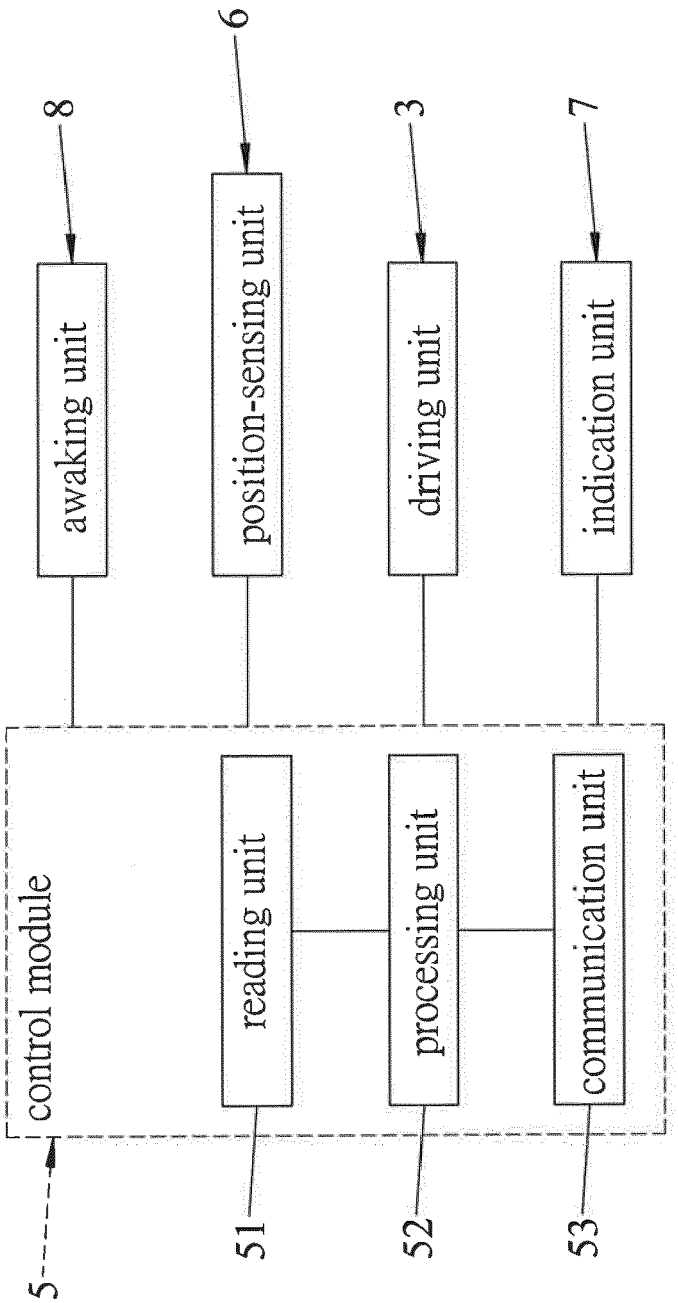
8
6
3
7
awaking unit
position-sensing unit
driving unit
indication unit
control module
reading unit
processing unit
communication unit
5
51
52
53

FIG.11

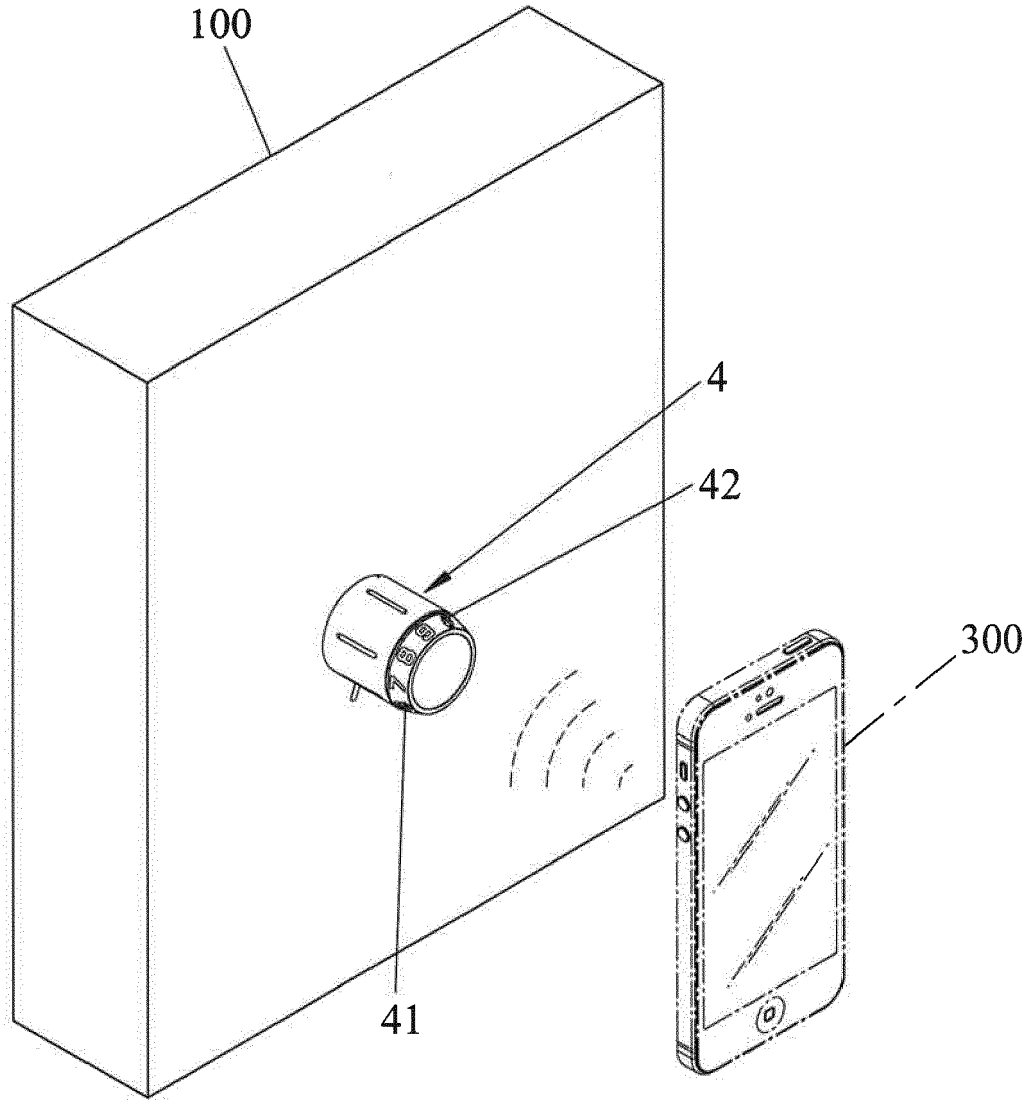

FIG.12

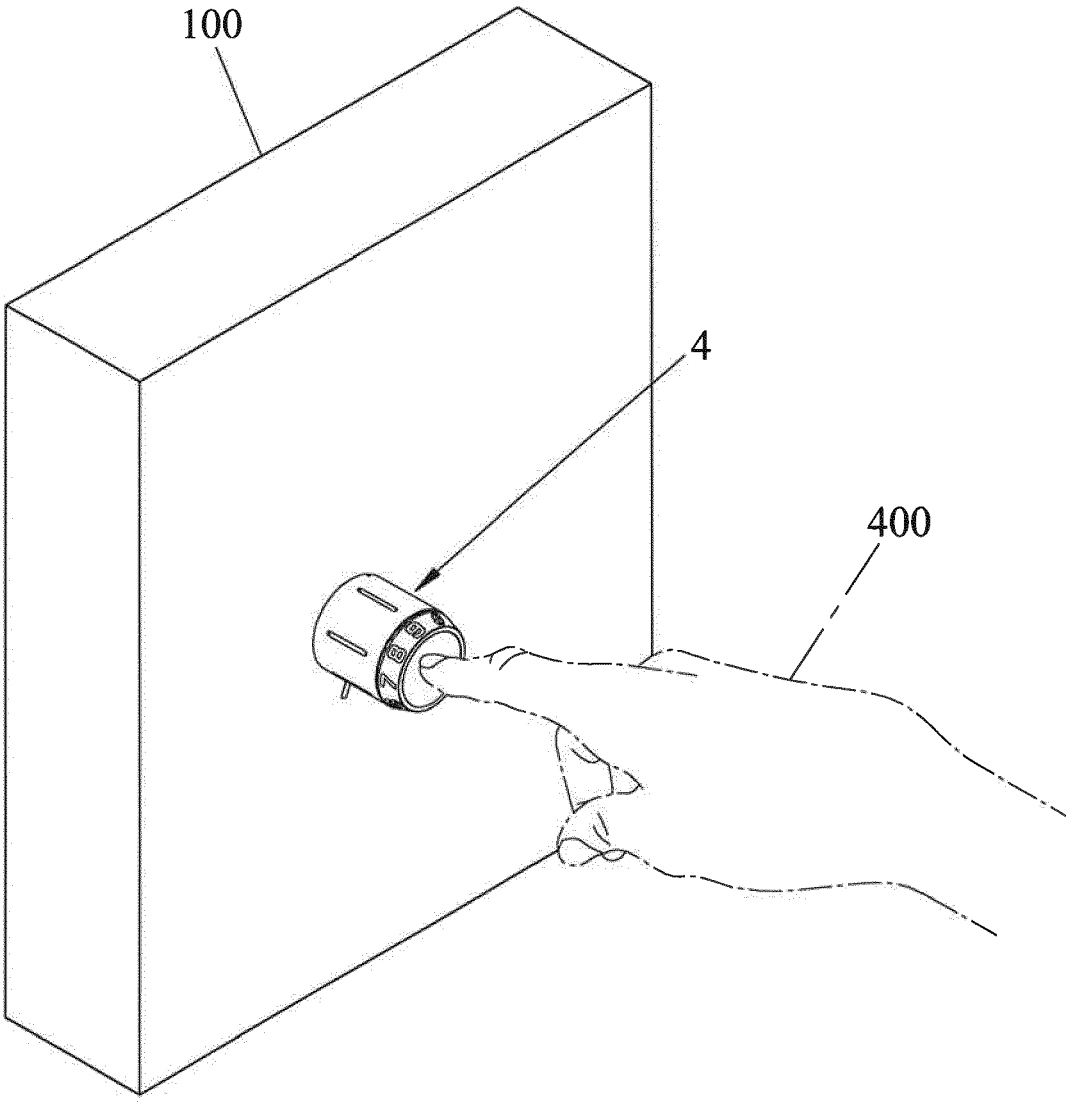

FIG.13

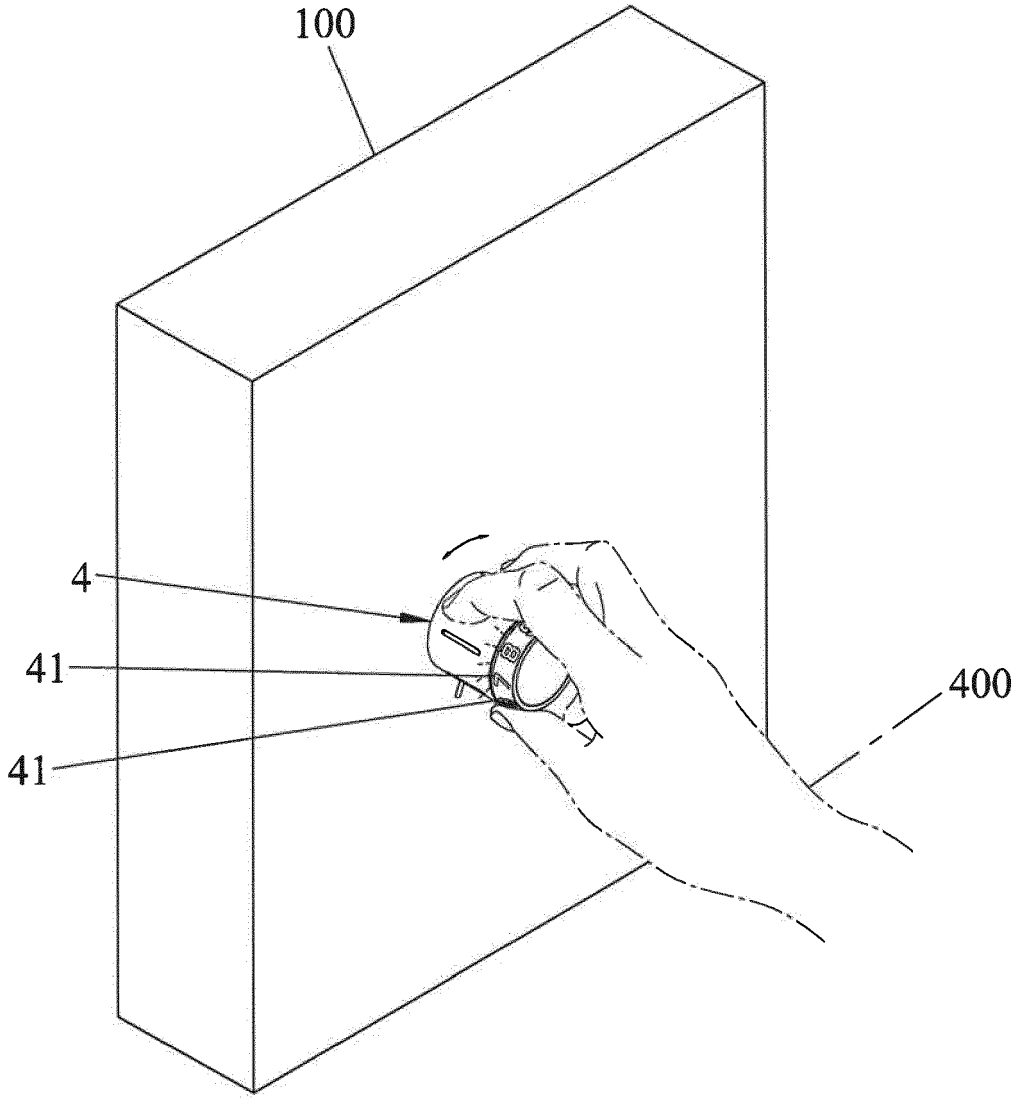

FIG.14

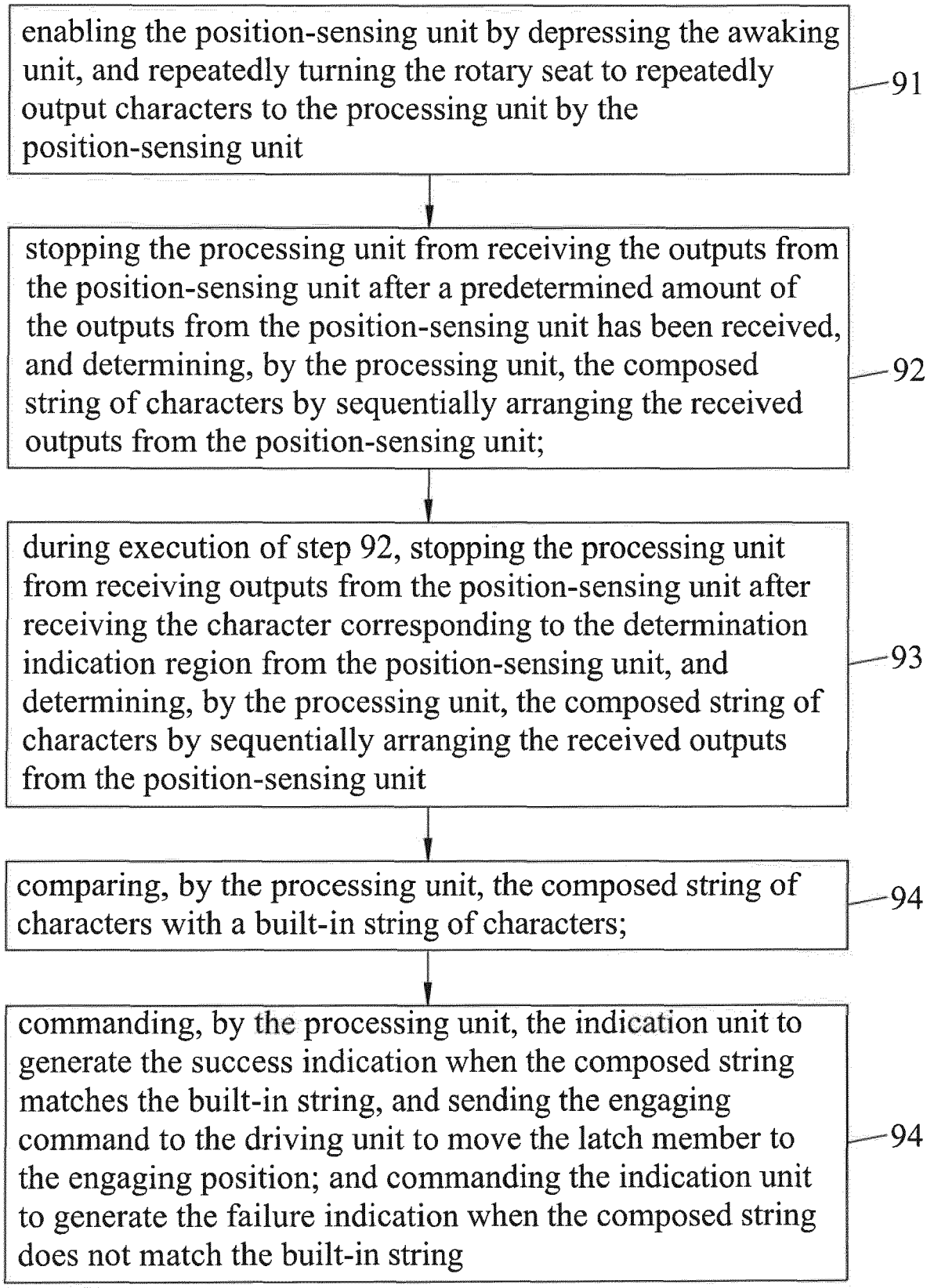
enabling the position-sensing unit by depressing the awaking unit, and repeatedly turning the rotary seat to repeatedly output characters to the processing unit by the position-sensing unit
91
stopping the processing unit from receiving the outputs from the position-sensing unit after a predetermined amount of the outputs from the position-sensing unit has been received, and determining, by the processing unit, the composed string of characters by sequentially arranging the received outputs from the position-sensing unit;
92
during execution of step 92, stopping the processing unit from receiving outputs from the position-sensing unit after receiving the character corresponding to the determination indication region from the position-sensing unit, and determining, by the processing unit, the composed string of characters by sequentially arranging the received outputs from the position-sensing unit
93
comparing, by the processing unit, the composed string of characters with a built-in string of characters;
94
commanding, by the processing unit, the indication unit to generate the success indication when the composed string matches the built-in string, and sending the engaging command to the driving unit to move the latch member to the engaging position; and commanding the indication unit to generate the failure indication when the composed string does not match the built-in string
94

FIG.15

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EUROPEAN SEARCH REPORT

Application Number
EP 19 18 0072

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2006 045195 B3 (SECCOR HIGH SECURITY GMBH [DE]) 30 April 2008 (2008-04-30)	1-10	INV.
Y	* the whole document *	1-10	E05B47/06
	-----		E05B49/00
X	DE 10 2006 002310 A1 (PRIMION TECHNOLOGY AG [DE]) 26 July 2007 (2007-07-26)	1-10	G07C9/00
Y	* the whole document *	1-10	

Y,D	CN 103 670 037 A (KEYU INTELLIGENCE CO LTD) 26 March 2014 (2014-03-26)	1	
A	* the whole document *	7	

Y	US 3 793 565 A (SMITH G) 19 February 1974 (1974-02-19) * the whole document *	1-10	

Y	US 2018/320412 A1 (MATOSIAN DANIEL [US]) 8 November 2018 (2018-11-08) * the whole document *	1	

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	-----		E05B G07C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 November 2019	Geerts, Arnold

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13-11-2019

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