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(54) **Cylinder lock assembly with mechanical and electronic mechanism**

Zylinderschlosseinheit mit mechanischem und elektronischem Mechanismus

Ensemble barillet de serrure avec mécanisme mécanique et électronique

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EP-A- 0 243 586 **EP-A- 0 401 647**
EP-A- 0 462 316

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a cylinder lock assembly having a mechanical and electronic locking function so as to provide two locking capabilities.

2. Description of Related Art

[0002] In general, a mechanical lock has multiple tumblers movably received in a lock core that is securely received inside a lock body. Thus, only a proper key inserted into a keyway defined in the lock core is able to activate movement of the tumblers. Therefore, rotation of the key is able to drive the lock core to rotate accordingly. Despite the varieties of mechanical locks, all the mechanical locks provide only a single locking function.

[0003] A conventional electrical lock includes a sensing card and a lock having a sensing unit to sense the information recorded on the sensing card so as to unlock the lock. This electrical lock, too, has only a single locking function and cannot provide sufficient security as required. As a result, the current locks, mechanical locks or the electrical locks, can only provide a single locking function and not dual locking functions to enhance security.

[0004] A lock mechanism having a mechanical lock and electronic locking components is known from each of EP-A-0 401 647, EP-A-0 462 316 and EP-A- 0 243 586. EP-A-0 401 647 and EP-A-0 462 316 in particular disclose a cylinder lock assembly having an electronic key. The cylinder lock body has a cutout defined in a central portion of the body to divide the body into two barrels. A cylinder lock core is received inside the body and has multiple tumblers movably received in the lock core and driven by the key, rotation of the key causing corresponding rotation of a cam which is movably received in the cutout of the body.

[0005] The electronic key of EP-A-0 401 647 has a code stored on a chip and a conductor connected to the chip. The cylinder lock core has an engagement bead engageable with the conductor. The cylinder lock includes a spring-loaded sliding bolt, blocked by a pivoting detent, for locking the cam and thus preventing rotation of the cylinder lock core. When a key having the right code is introduced into the cylinder lock core, an unlocking signal is sent to an electromagnet, which releases the detent, so that the sliding bolt is retracted and the lock core and the cam can be turned by the key.

[0006] EP-A-0 243 586 discloses a cylinder lock assembly comprising a cylinder lock and an electronic key. A cam is movably received in the cutout of the cylinder body. A free-rotatable cylinder lock core is received inside the cylinder lock body. When a key having the right code is introduced into the cylinder lock core, a coupling device comprising a clutch is operated by an electromagnet for coupling the cylinder lock core with the cam, so that the cam can be rotated by the key.

SUMMARY OF THE INVENTION

[0007] A primary objective of the present invention is to obviate the shortcoming of the conventional lock and to improve the lock core adopted from an electronic lock to achieve dual protection effect and hence the novelty and industrial application requirement is met.

[0008] A secondary objective of the present invention is to accomplish two different protection effects with simplified structure and low manufacture cost such that the market requirements is met and industrial value is high.

[0009] Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Figure 1 is a perspective view of a cylinder lock assembly in accordance with an embodiment of the present invention;

Figure 2 is an exploded perspective view of the cylinder lock assembly in accordance with an embodiment of the present invention;

Figure 3 is a cross-sectional view of the lock core of the cylinder lock assembly with a first clutch detached from a second clutch;

Figure 4 is a cross-sectional view showing that the first clutch and the second clutch are engaged with each other;

Figure 5 is a schematic view showing a status where an engagement sensing element has not been moved by the first clutch;

Figure 6 is a schematic view showing a status where the engagement sensing element is moved by the first clutch;

Figure 7 is an exploded perspective view showing an example of another design of a lock assembly which is not according to the present invention;

Figure 8 is a cross-sectional view showing the inner structure of the design of Fig.7;

Figure 9 is an enlarged cross-sectional view showing that the coupling device of the design of Fig.7 is disengaged and the key is rotatable; and

Figure 10 is an enlarged cross-sectional view showing that the coupling device of the design of Fig.7 is engaged and the key is immovable.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0011] With reference to Figures 1 and 2, a cylinder

lock assembly constructed in accordance with an embodiment of the present invention comprises a cylinder lock body 1, a lock core 7, a rotor 81, a sensing device 39, a driving element 69 and a coupling device composed of a first clutch 25 and a second clutch 33. The cylinder body 1 has a hollow barrel 5 and a cutout 3 dividing the barrel 5 into two halves to receive therein a cam 77 having a boss 79 formed on a bottom of the cam 77. A first radial slit 10 and a second radial slit 102 are respectively formed on a front portion and a rear portion of the barrel 5.

[0012] The lock core 7 is a hollow cylinder and has two opposed paths 11 respectively defined in parallel to a longitudinal axis of the cylinder in a side periphery of the lock core 7, a passage 13 axially defined in the side periphery of the lock core 7 and a groove 19 defined in a proximal end of the lock core 7. The passage 13 is provided to receive therein a pad 15, an abutting element 23 that engages with the pad 15 and a cover 232. The pad 15 has a through hole 17 defined through the pad 15 to receive therein an engagement bead 231 which is engaged with the abutting element 23. The cover 232 is provided to secure the abutting element 23 and the engagement bead 231 inside the pad 15. The lock core 7 further has multiple tumblers (not shown) inside the lock core 7. Because how the tumblers are moved is well known in the art, detailed description thereof is omitted for brevity.

[0013] The rotor 81 is a hollow cylinder with two open ends. The rotor 81 has two first slits 83 each defined in two opposed side periphery of the rotor 81 to be parallel to an axial axis of the rotor 81 and at least one second slit 85 (two are shown in this embodiment) parallel to the axial axis of the rotor 81. A flange 810 is formed on an outer periphery of the rotor 81.

[0014] The first clutch 25 has two first bosses 27 respectively formed on two opposed ends of the first clutch 25 to be received in the two paths 11 of the lock core 7 and an extension 29 formed on a side of the first clutch 25 and having a recess 31 defined to be parallel to an axial axis of the extension 29. The second clutch 33 has a cavity 37 defined to correspond to the extension 29 of the first clutch 25 and two second bosses 35 to be received in the first slits 83 of the rotor 81.

[0015] The sensing device 39 includes a first rotation pad 41, a first rotation ring 47, a second rotation pad 59, and a second rotation ring 53. The first rotation pad 41 has a first bar 43 extending from a side of the first rotation pad 41 and a first conductor 45. The second rotation pad 59 has two second bars 61 extending from a rear side of the second rotation pad 59 and two apertures 63 defined in a front side of the second rotation pad 59 and extending into the apertures 63 respectively. A first conducting bead 55 and a second conducting bead 57 are respectively received in and partially extended out of the two apertures 63. The first rotation ring 47 has an indent 49 defined to movably receive therein an engagement element 51.

[0016] The driving element is designated with a reference numeral 69 and may be a motor. The motor's shaft is connected to a threaded rod 71, which in turn is threaded to a nut 73. The nut 73 is connected to an actuator 75 that is composed of a first actuator 751, a second actuator 752, and a third actuator 753. Because how the first actuator 751, the second actuator 752, and the third actuator 753 are operated is not the focus of the present invention, detailed description thereof is thus omitted. After the combination between the motor 69 and the actuator 75 via the nut 73, the combination is assembled into a motor bracket 65 whose rear end is connected to a master circuit board 91. Thereafter, a cylindrical conducting seat 67 is mounted outside the motor bracket 67. The motor bracket 65 has four arms 650 formed on a distal end of the motor bracket 65 to correspond to the first slits 83 and the second slits 85

[0017] In addition, the cylinder lock assembly has an alarming system to sound off an alarm when an unauthorized personnel is trying to inappropriately open the lock so as to upgrade the safety of the lock. In order to achieve the goal, the lock further has a rotation seat 89. The rotation seat 89 has a battery 93 and a buzzer 95 both received in the rotation seat 89 and electrically connected to the master circuit board 91. A cover 97 is provided to the rotation seat 89 to enclose the battery 93 and the buzzer 95 inside the rotation seat 89.

[0018] After the first conducting bead 55 and the second conducting bead 57 are received in the apertures 63 and the engagement sensing element 51 is received in the indent 49 of the first rotation ring 47, the first rotation ring 47 and the second rotation ring 53 are sandwiched between the first rotation pad 41 and the second rotation pad 59 such that the first rotation ring 47 is engaged with the first rotation pad 41 and the second rotation ring 53 is engaged with the second rotation pad 59 and the first conducting bead 55 is extended into the first bar 43. After extending the extension 29 of the first clutch 25 through the rotation pads and the rotation rings, the two first bosses 27 of the first clutch 25 are received in the paths 11 of the lock core 7. Then the lock core 7 is inserted into the front portion of the hollow barrel 5 of the cylinder body 1. A first positioning ring is applied to pass through the first radial slit 10 and the groove 19 of the lock core 7 so as to secure the lock core 7 inside the cylinder body 1.

[0019] The motor bracket 65 after assembled with the master circuit board 91, the motor 69, the nut 73, the actuator 75 and the conducting seat 67 enables its four arms 650 to respectively extend into the first slits 83 and the second slits 85 so as to allow the motor bracket 65 to be assembled inside the rotor 81. Then the two bosses 35 of the second clutch 33 are extended into the first slits 83 of the rotor 81. Thereafter, the rotor 81 is extended into the barrel 5 of the lock body 1 and pass over the cam 77 that is rested in the cutout 3 in the lock boy 1. A screw or the like is used to secure the position of the cam 77 relative to the rotor 81. A positioning ring is applied to extend through the second radial slit 102 of the body 1 and secured to an outer periphery of the rotor 81 by engagement with the flange 810 such that the rotor 81 will

not detach from the barrel 5 of lock body 1. Lastly the rotation seat 89 is assembled to the rear end of the lock body 1.

[0020] The first bar 43 of the first rotation pad 41 is engaged with the abutting element 23 and the engagement sensing element 51 is extended into the recess 31 of the first clutch 25. At the moment, the engagement sensing element 51 is not in engagement with the second conducting bead 57. The two second bars 61 of the second rotation pad 59 are engaged with one end of the conducting seat 67, which is electrically connected to the master circuit board 91. The master circuit board 91 is electrically connected to the motor 69. The master circuit board 91 is able to send a signal to the motor 69 to activate/deactivate the motor 69 and to the buzzer 95 so that the buzzer 95 is able to send out an alarm.

[0021] A key 99 with a built-in circuit board is shown in Figure 2, wherein the key 99 is composed of a key body 101, a chip 105, and a conductor 107. The chip 105 is securely attached to a side of the key body 101 and then the conductor 107 to attached to a free side of the chip 105. Thereafter, an encapsulation 103 is provided to enclose the combination of the chip 105 and the conductor 107 to avoid contamination.

[0022] With reference to Figures 3 and 4, when the lock of the present invention is in a locked status, a dual protection mechanism is accomplished. That is, the first locking function is accomplished by the conventional latching function of the lock core 7 and the second locking function is accomplished by the clutch of the present invention. When the user is trying to unlock the lock of the present invention, the user has to unlock the conventional latching mechanism and then the clutch to complete the unlocking process of the present invention. If only the first mechanism is unlocked, and an unauthorized person is trying to break the lock, the buzzer 95 will send out an alarm. If the chip 105 is connected to a security authority, the warning signal will send the alarm to the security authority to have better protection.

[0023] To be more specific, before the key is inserted into the lock core 7, the lock of the present invention is locked by the conventional tumblers and thus the lock core 7 is not rotatable. In the meantime, because the master circuit board 91 does not receive any signal from the chip 105, the motor 69 inside the lock of the present invention is immovable to unlock the lock. However, after the insertion of the key, the lock core 7 is unlocked to allow the lock core 7 to be rotatable so as to deactivate the conventional latching mechanism. In the meantime, the conductor 107 is engaged with the engagement bead 231. By way of the abutting element 23, the first bar 43, the first conducting bead 55, the second bar 61 and the conducting seat 67, the information in the chip 105 will be transmitted to the master circuit board 91 to verify whether the inserted key is correct. The key 99, after being inserted into the lock core 7, is engaged with the first conductor 45. The first clutch 25 pushed by the key 99 will be moved axially so as to push the sensing element 51 to engage with the second conducting bead 57, as shown in Figures 5 and 6. Therefore, an electrical connection is established among the first conductor 45, the sensing element 51, the second conducting bead 57, the second bars 61, the conducting seat 67 and the master circuit board 91. After verification is confirmed, the motor 69 is activated by the master circuit board 91 and the motor 69 drives the threaded rod 71 to rotate, which in turn drives the actuator 75 and the second clutch 33 to move toward the key 99 via the nut 73. In the meantime the cavity 37 of the second clutch 33 is aligned with the extension 29 of the first clutch 25, as shown in Figure 4. Thus rotation of the key 99 is able to rotate the lock core 7, the rotor 81 is also rotated such that the boss of the cam 77 is also moved and the lock is unlocked.

[0024] When the rotor 81 is rotated, the master circuit board 91 is able to determine whether the lock of the present invention is in a normal operational status. That is, if only the lock core 7 is rotated but not the rotor 81, the master circuit board 91 is able to send out a signal to the buzzer to generate the alarm. An electromagnetic valve can be applied to the cylinder lock to replace the motor 69. The electromagnetic valve is connected to the second clutch 33 so as to move the second clutch 33 to move linearly.

[0025] With reference to Figures 7-10, another example of a design of a lock mechanism, which is not according to the present invention, is shown to have a lock body 1, a lock core 7, a rotor 81, and a coupling device. The cylinder body 1 has a hollow barrel 5 and a cutout 3 dividing the barrel 5 into two halves to receive therein a cam 77 having a boss 79 formed on a bottom of the cam 77.

[0026] The lock core 7 is a hollow cylinder and has two opposed paths 11 respectively defined in parallel to a longitudinal axis of the cylinder in a side periphery of the lock core 7, a passage 13 axially defined in the side periphery of the lock core 7 and a groove 19 defined in a proximal end of the lock core 7. The passage 13 is provided to receive therein a pad 15 and a spring 23 that engages the pad 15. The lock core 7 further has multiple tumblers (not shown) inside the lock core 7. A first rotation circuit board 123 is securely mounted on a distal end of the lock core 7 and has multiple second cutouts 125 defined in a periphery of the first rotation circuit board 123 such that multiple screws (not shown) are able to extend through the second cutout 125 and into the distal end of the lock core 7 to secure the first rotation circuit board 123. The first rotation circuit board 123 has a contact 131 securely mounted on the first rotation circuit board 123.

[0027] The rotor 81 has a longitudinally defined first slit 83 and a side slit 85 defined along the first slit 83. The first slit 83 and the side slit 85 communicate with an open end defined in a distal end of the rotor 81. A second rotation circuit board 127 is securely mounted on the distal end of the rotor 81 and has a second contact 131 mounted thereon. A hole 811 is defined in a side face of the rotor 81.

[0028] The coupling device includes a first clutch 109,

a second clutch 115, and a third clutch 133. The second clutch 115 has two opposed bosses 117 each formed on an end of the second clutch 115 to be received in the path 11 of the lock core 7 and a protrusion 121 formed on a side face of the second clutch 31. Before the first rotation circuit board 123 is secured to the distal end of the lock core 7, the second clutch 115 is first placed in a central hole 9 of the lock core 7 with the two bosses 117 received in the path 11 and then the first rotation circuit board 123 is mounted on the distal end of the lock core 7. Multiple first springs 119 are received between the first rotation circuit board 123 and the second clutch 115. After the pad 15 and the spring 23 are received in the passage 13 of the lock core 7, the lock core 7 is assembled in a front portion of one of the barrels 5 of the body 1. A positioning ring 233 is applied to extend the radial slit 10 and into the groove 19 of the lock core 7 to prevent the lock core 7 from moving axially in the body 1. However, the lock core 7 is able to rotate inside the body 1.

[0029] The first clutch 109 has an indent 113 corresponding to the protrusion 121 of the second clutch 115 and two opposed first blocks 111 respectively formed on a side of the first clutch 109 to be received in the first slit 83 of the rotor 81.

[0030] The third clutch 133 has two second blocks 137 respectively formed on a side face of the third clutch 133 to be received in the first slit 83 of the rotor 81 and an elongated hole 141 defined in a side of the third clutch 133. A through hole 135 is defined in a front face of the third clutch 133 to communicate with a threaded hole 145 of a seat 143 after the seat 143 is received in the third clutch 133 from the elongated hole 141. Thereafter, a projection 147 formed with the seat 143 is extended out of the elongated hole 141. Both the third clutch 133 and the seat 143 are received in the rotor 81 with the two second blocks 135 received in the first slit 83. A second spring 139 is sandwiched between the first clutch 109 and the third clutch 133. The rotor 81 further has a driving element, positioning block 153 and a conductor 149 having two opposed arms 151 respectively formed on a side of the conductor 149. The positioning block 153 has two opposed cutouts (not numbered) to securely receive therein the conductor 149 and allow the two arms 151 to extend out of the positioning block 153. In this embodiment, the driving element is a motor 69 having a motor shaft extending through a motor bracket 155 to be threadingly connected to a threaded bolt 71 and the threaded hole 145 of the seat 141. The motor 69, the motor bracket 155, the third clutch 133, and the seat 143 are assembled inside the rotor 81 to have the projection 147 positioned between the two arms 151. Then the second rotation circuit board 127 is positioned in the rotor 81 by screws extending through the third cutouts 129 of the second rotation circuit board 127 and into the rotor 81. A bolt 163 is provided to extend through a clamping ring 161 and into the hole 811 of the rotor 81 so as to position the rotor 81 with the clamping ring 161.

[0031] A ring 157 having teeth formed on an inner side of the ring 157 is assembled with the body 1 via a second slit radially defined in the barrel 5 of the body 1 to allow the rotor 81 to extend through the ring 157 and the cam 77 which is received in the cutout 3 of the body 1 . Screws are applied to secure the cam 77 to an outer periphery of the rotor 81. A sensor 159 is mounted on the outer periphery of the rotor 81 and the sensor 159 is facing the teeth of the ring 157 after the rotor 81 is received in the barrel 5 of the body 1.

[0032] After the aforementioned elements are assembled inside the body 1, because the bosses 117 of the second clutch 115 are received in the path 11 of the lock core 7, there is no relative rotation between the second clutch 115 and the lock core 7. The spring 23 is electrically connected to the first rotation circuit board 123 so that the first rotation circuit board 123 is able to receive signals from the spring 23.

[0033] The motor 69 is able to drive the threaded bolt 71 so as to move the seat 143, which in turn drives the third clutch 133 to move. Movement of the third clutch 133 moves the first clutch 109 via the second spring 139. Because the projection 147 of the seat 143 is received in the side slit 85 of the rotor 81, the movement of the seat 143 allows the projection 147 to move away from or into the side slit 85. Meanwhile the first blocks 137 and the second blocks 111 are also moved into or away from the first slit 83 of the rotor 81. When the projection 147 is extended out of the side slit 85 and the first blocks 137 and the second blocks 111 are moved into the first slit 83, the rotor 81 can not be rotated. However, when the first blocks 137 and the second blocks 111 are moved out of the first slit 83, the rotor 81 can be rotated. When the rotor is rotated, the boss 79 is moved in the cutout 3 to drive a different locking device (not shown).

[0034] The lock mechanism further has an alarm system to sound an alarm when there is an unauthorized person trying to unlock the lock mechanism so as to enhance the safety of the lock mechanism. In this example, there is further provided a rotation seat 89. The rotation seat 89 has a master circuit board 91, a battery 93, a buzzer 95, and a cover 97 provided in front of the rotation seat 89. The battery 93, the buzzer 95, and the master circuit board 93 are electrically connected with one another and the master circuit board 91 is electrically connected to the second rotation circuit board 127 and the sensor 159.

[0035] A key 99, as shown in Figure 7, provided with embedded circuit includes a body 101, a chip 105 formed in the body 101 and having a conducting plate 103 integrally formed on the chip 105 and an encapsulation (not shown) enclosing the chip 105 inside the body 101 to avoid damage to the chip 105. The contacts 131 on the first rotation circuit board 123 and the second rotation circuit board 127 are able to send signals to the motor and the clutch device so as to drive the lock mechanism.

[0036] When the lock mechanism is in a locked status, there will be two different locking mechanisms to provide the desired locking effect, namely the conventional latch-

ing mechanism in the lock core 7 and the coupling device. If a user is trying to unlock the lock mechanism, the user will have to unlock the lock core 7 and the clutch device of the lock mechanism sequentially, otherwise the buzzer 95 will sound an alarm to warn the security guard that there is an illegal action going on. To be more specific of the operation of the lock mechanism, it is to be noted that before the key 99 is inserted into the lock core 7, the multiple tumblers will lock the lock core 7 to prevent the lock core 7 from rotation such that the lock mechanism is locked. Because how the tumblers lock the lock core 7 is conventional in the art, detailed description thereof is omitted for brevity. In the meantime, the first rotation circuit board 123 and the second rotation circuit board 127 are fixed so that there is no signal transmitted to the master circuit board 89 to drive the motor 69 to move. The third clutch 133 and the first clutch 109 are received in the rotor 81 and thus the first blocks 111 of the first clutch 109 and the second blocks 137 of the third clutch 133 are received in the first slit 83 of the rotor 81 to disable the rotation of the rotor 81. A second locking effect is accomplished.

[0037] On the contrary, after the key 99 is inserted into the lock core 7, the tumblers are rearranged to allow the lock core 7 to be rotatable. Meanwhile the conducting plate 103 of the chip 105 engages with the spring 23 such that code information in the chip 105 will be transmitted to the first rotation circuit board 123 via the spring 23. Then the information is transmitted to the master circuit board 91 via the contacts 131 of the first rotation circuit board 123 and the second rotation circuit board 127. After the master circuit board 91 receives the information, the motor 69 is activated to drive the threaded bolt 71 to rotate. The rotation of the threaded bolt 71 drives the third clutch 133 and the first clutch 109 to move toward the key 99 to allow the first blocks 137 and the second blocks 111 to be away from the first slit 83 and to allow engagement between the first clutch 109 and the second clutch 115, until the extension 147 of the seat 143 engages with one of the arms 151 of the conductor 149 such that the motor 69 is stopped. Therefore, rotation of the key 99 drives not only the lock core 7, but also the rotor 81 and thus the boss 79 of the cam 77 is driven to unlock the lock mechanism. While the rotor 81 is rotated, the sensor 159 is able to sense the teeth of the ring 157 and the master circuit board 91 will determine whether the lock mechanism is in normal unlocking condition and thus the buzzer 95 will not sound an alarm. However, if only the lock core 7 is rotated but not the rotor 81, the buzzer 95 will then sound the alarm. The motor 69 can be replaced by an electromagnetic valve that is connected to the third clutch 133 to drive the third clutch 133 to move linearly so as to accomplish the aforementioned objective.

[0038] Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

Claims

1. A cylinder lock assembly comprising:

an electronic key (99) having a chip (105) and a conductor (107) connected to the chip, the electronic key having information in the chip;

a cylinder lock body (1) having a cutout (3) defined in a central portion of the cylinder lock body (1) to divide the cylinder lock body (1) into two barrels (5);

a cylinder lock core (7) received inside the cylinder lock body (1) and having a latching mechanism therein formed by multiple tumblers movably received in the cylinder lock core (7) and driven by the key (99), the cylinder lock core (7) being rotatable within the cylinder lock body (1) upon insertion and rotation of a key when the latching mechanism is deactivated, the cylinder lock core (7) having an engagement bead (231) engageable with the conductor (107) and a passage (11) longitudinally defined in an outer periphery of the cylinder lock core (7),

a rotor (81) movably received in the cylinder lock body (1) and having a first slit (83) longitudinally defined in the rotor and a side slit (85) radially defined in the rotor;

a cam (77) movably received in the cutout (3) of the cylinder lock body (1) and securely received in the rotor (81);

a coupling device having a first clutch (25) and a second clutch (33), wherein the first clutch is received in the passage (11) of the cylinder lock core (7), the second clutch (33) is received in the first slit (83) of the rotor (81);

a driving element (69) connected to an actuator (75) and assembled into a motor bracket (65) to drive the second clutch (33) to move so that the second clutch (33) is able to move away or into the first slit (83) of the rotor (81);

a master circuit board (91) assembled with the driving element (69) and actuator (75) and being electrically connected to the driving element (69) and received in the rotor (81);

a sensing device (39) provided between the first clutch (25) and the second clutch (33), the sensing device including a first rotation pad (41), a first rotation ring (47), a second rotation pad (59) and a second rotation ring (53), the sensing device (39) being electrically connected to the master circuit board (91) and the driving element

(69) such that the key (99), after being inserted into the cylinder lock core (7), is engaged with a first conductor (45) of the first rotation pad (41) and when an engagement sensing element (51) is electrically connected to a second conductor bead (57) , a signal is transmitted to the master circuit board (91) to activate the driving element (69) and drive the second clutch to move, whereby the second clutch is moved after verification whether the inserted key is correct, and thus rotation of the key (99) rotates the cylinder lock core (7) and the rotor (81); and
a power source (93) electrically connected to the driving element (69) and the master circuit board (91).

2. The cylinder lock assembly as claimed in Claim 1, wherein the driving element is a motor (69) having a motor shaft in connection with a threaded bolt (71) which is connected to a nut (73) and the nut is connected to the second clutch (33).

3. The cylinder lock assembly as claimed in Claim 2, wherein the actuator (75) is sandwiched between the driving element (69) and the coupling device.

4. The cylinder lock assembly as claimed in Claim 1, wherein the driving element (69) is an electromagnetic valve in connection with a threaded bolt (71) that is connected to a nut (73).

5. The cylinder lock assembly as claimed in Claim 3 further comprising a conducting seat (67) to sequentially receive therein the master circuit board (91), the driving element (69) and the actuator (75), the conducting seat is electrically connected to the sensing device (39) and the master circuit board (91).

6. The cylinder lock assembly as claimed in Claim 1, wherein the first rotation ring (47) and the second rotation ring (53) are sandwiched between the first rotation pad (41) and the second rotation pad (59) and the first rotation pad (41) engages with an abutting element (23) in the lock core (7).

7. The cylinder lock assembly as claimed in Claim 6, wherein the first rotation ring (47) has the engagement sensing element (51), the first clutch (25) has a recess (31), the engagement sensing element (51) is received in the recess (31) so that when the first clutch (25) is moved, the engagement sensing element (51) is moved to engage with the second conducting bead (57).

8. The cylinder lock assembly as claimed in Claim 1 further having a buzzer (95) electrically connected to the master circuit board (91).

9. The cylinder lock assembly as claimed in Claim 1, wherein the power source is a battery (93).

Patentansprüche

1. Zylinderschlossanordnung, umfassend:

einen elektronischen Schlüssel (99) mit einem Chip (105) und einem mit dem Chip verbundenen Leiter (107), wobei der elektronische Schlüssel Informationen in dem Chip aufweist;
ein Zylinderschlossgehäuse (1) mit einer Aussparung (3), die in einem zentralen Teil des Zylinderschlossgehäuses (1) definiert ist, um das Zylinderschlossgehäuse (1) in zwei Zylinder (5) zu teilen;
einen Zylinderschlosskern (7), der in dem Zylinderschlossgehäuse (1) aufgenommen ist und in ihm einen Verriegelungsmechanismus aufweist, der von mehreren Zuhaltungen gebildet wird, die beweglich in dem Zylinderschlosskern (7) aufgenommen sind und von dem Schlüssel (99) angetrieben werden, wobei der Zylinderschlosskern (7) in dem Zylinderschlossgehäuse (1) bei Einführen und Drehen eines Schlüssels drehbar ist, wenn der Verriegelungsmechanismus deaktiviert ist, wobei der Zylinderschlosskern (7) einen Eingriffsbolzen (231) aufweist, der mit dem Leiter (107) und einem Durchgang (11), der in einem äußeren Umfang des Zylinderschlosskerns (7) längs definiert ist, in Eingriff gebracht werden kann;
einen Rotor (81), der beweglich in dem Zylinderschlossgehäuse (1) aufgenommen ist und einen ersten Schlitz (83), der längs in dem Rotor definiert ist, und einen seitlichen Schlitz (85), der radial in dem Rotor definiert ist, aufweist;
einen Nocken (77), der beweglich in der Aussparung (3) des Zylinderschlossgehäuses (1) aufgenommen ist und sicher in dem Rotor (81) aufgenommen ist;
eine Verbindungsvorrichtung mit einer ersten Kupplung (25) und einer zweiten Kupplung (33), bei der die erste Kupplung in dem Durchgang (11) des Zylinderschlosskerns (7) aufgenommen ist, die zweite Kupplung (33) in dem ersten Schlitz (83) des Rotors (81) aufgenommen ist;
ein Antriebselement (69), das mit einem Stellantrieb (75) verbunden ist und in eine Motorhalterung (65) eingebaut ist, um die zweite Kupplung (33) zur Bewegung anzutreiben, so dass die zweite Kupplung (33) sich weg- oder in den ersten Schlitz (83) des Rotors (81) bewegen kann;
eine Hauptleiterplatte (91), die mit dem Antriebselement (69) und dem Stellantrieb (75) zusammengebaut ist und elektrisch mit dem Antriebs-

element (69) verbunden ist und in dem Rotor (81) aufgenommen ist;
eine Erfassungsvorrichtung (39), die zwischen der ersten Kupplung (25) und der zweiten Kupplung (33) bereitgestellt ist, wobei die Erfassungsvorrichtung ein erstes Drehstück (41), einen ersten Drehring (47), ein zweites Drehstück (59) und einen zweiten Drehring (53) aufweist, wobei die Erfassungsvorrichtung (39) elektrisch mit der Hauptleiterplatte (91) und dem Antriebselement (69) verbunden ist, so dass der Schlüssel (99), nachdem er in den Zylinderschlosskern (7) eingeführt worden ist, mit einem ersten Leiter (45) des ersten Drehstücks (41) in Eingriff ist, und wenn ein Eingrifferfassungselement (51) elektrisch mit einem zweiten leitenden Bolzen (57) verbunden ist, ein Signal an die Hauptleiterplatte (91) gesendet wird zum Aktivieren des Antriebselements (69) und zum Antreiben der zweiten Kupplung zur Bewegung, wodurch die zweite Kupplung nach der Überprüfung, ob der eingeführte Schlüssel richtig ist, bewegt wird und so die Drehung des Schlüssels (99) den Zylinderschlosskern (7) und den Rotor (81) dreht; und
eine Stromquelle (93), die elektrisch mit dem Antriebselement (69) und der Hauptleiterplatte (91) verbunden ist.

2. Zylinderschlossanordnung nach Anspruch 1, bei der das Antriebselement ein Motor (69) mit einer Motorwelle in Verbindung mit einem Gewindestift (71) ist, der mit einer Mutter (73) verbunden ist, und wobei die Mutter mit der zweiten Kupplung (33) verbunden ist.

3. Zylinderschlossanordnung nach Anspruch 2, bei der der Stellantrieb (75) zwischen dem Antriebselement (69) und der Verbindungsvorrichtung eingelegt angeordnet ist.

4. Zylinderschlossanordnung nach Anspruch 1, bei der das Antriebselement (69) ein elektromagnetisches Ventil in Verbindung mit einem Gewindestift (71) ist, der mit einer Mutter (73) verbunden ist.

5. Zylinderschlossanordnung nach Anspruch 3, ferner umfassend einen leitenden Sitz (67) zum Aufnehmen der Hauptleiterplatte (91), des Antriebselements (69) und des Stellantriebs (75) nacheinander in ihm, wobei der leitende Sitz elektrisch mit der Erfassungsvorrichtung (39) und der Hauptleiterplatte (91) verbunden ist.

6. Zylinderschlossanordnung nach Anspruch 1, bei der der erste Drehring (47) und der zweite Drehring (53) zwischen dem ersten Drehstück (41) und dem zweiten Drehstück (59) eingelegt angeordnet sind und das erste Drehstück (41) mit einem Widerlageelement (23) in dem Schlosskern (7) in Eingriff ist.

7. Zylinderschlossanordnung nach Anspruch 6, bei der der erste Drehring (47) das Eingriffserfassungselement (51) aufweist, die erste Kupplung (25) eine Aussparung (31) aufweist, das Eingriffserfassungselement (51) in der Aussparung (31) aufgenommen ist, so dass, wenn die erste Kupplung (25) bewegt wird, das Eingriffserfassungselement (51) bewegt wird, um mit dem zweiten leitenden Bolzen (57) in Eingriff zu kommen.

8. Zylinderschlossanordnung nach Anspruch 1, die ferner einen elektrisch mit der Hauptleiterplatte (91) verbundenen Summer (95) aufweist.

9. Zylinderschlossanordnung nach Anspruch 1, bei der die Stromquelle eine Batterie (93) ist.

Revendications

1. Ensemble de serrure à barillet comprenant :

une clé électronique (99) possédant une puce (105) et un conducteur (107) connecté à la puce, la clé électronique possédant des informations dans la puce ;
un corps de serrure à barillet (1) possédant une découpe (3) définie dans une partie centrale du corps de serrure à barillet (1) pour diviser le corps de serrure à barillet (1) en deux barillets (5) ;
un noyau de serrure à barillet (7) reçu à l'intérieur du corps de serrure à barillet (1) et possédant un mécanisme de verrouillage dans celui-ci formé par de multiples gorges reçues de manière mobile dans le noyau de serrure à barillet (7) et entraînées par la clé (99), le noyau de serrure à barillet (7) étant pivotable à l'intérieur du corps de serrure à barillet (1) lors de l'insertion et la rotation d'une clé lorsque le mécanisme de verrouillage est désactivé, le noyau de serrure à barillet (7) possédant une bille de mise en prise (231) pouvant être mise en prise avec le conducteur (107) et un passage (11) défini longitudinalement dans une périphérie externe du noyau de serrure à barillet (7) ;
un rotor (81) reçu de manière mobile dans le corps de serrure à barillet (1) et possédant une première fente (83) définie longitudinalement dans le rotor et une fente latérale (85) définie radialement dans le rotor ;
une came (77) reçue de manière mobile dans la découpe (3) du corps de serrure à barillet (1) et solidement reçue dans le rotor (81) ;
un dispositif de couplage possédant un premier

embrayage (25) et un second embrayage (33), où le premier embrayage est reçu dans le passage (11) du noyau de serrure à barillet (7), le second embrayage (33) étant reçu dans la première fente (83) du rotor (81) ;
un élément d'entraînement (69) connecté à un actionneur (75) et assemblé dans un support de moteur (65) pour entraîner le second embrayage (33) à se déplacer de manière à ce que le second embrayage (33) soit en mesure de s'éloigner ou de pénétrer dans la première fente (83) du rotor (81) ;
une carte de circuit imprimé maîtresse (91) assemblée avec l'élément d'entraînement (69) et l'actionneur (75) et étant connectée électriquement à l'élément d'entraînement (69) et reçue dans le rotor (81) ;
un dispositif de détection (39) prévu entre le premier embrayage (25) et le second embrayage (33), le dispositif de détection incluant un premier coussinet de rotation (41), un premier anneau de rotation (47), un second coussinet de rotation (59) et un second anneau de rotation (53), le dispositif de détection (39) étant connecté électriquement à la carte de circuit imprimé maîtresse (91) et l'élément d'entraînement (69) de telle manière à ce que la clé (99), après avoir été insérée dans le noyau de serrure à barillet (7), soit mise en prise avec un premier conducteur (45) du premier coussinet de rotation (41) et lorsqu'un élément de détection de mise en prise (51) est connecté électriquement à une seconde bille conductrice (57), un signal soit transmis à la carte de circuit imprimé maîtresse (91) pour activer l'élément d'entraînement (69) et entraîner le second embrayage à se déplacer, grâce à quoi le second embrayage est déplacé après vérification si la clé insérée est correcte, et ainsi la rotation de la clé (99) fait pivoter le noyau de serrure à barillet (7) et le rotor (81) ; et une source d'énergie (93) connectée électriquement à l'élément d'entraînement (69) et la carte de circuit imprimé maîtresse (91).

2. Ensemble de serrure à barillet tel que revendiqué à la Revendication 1, où l'élément d'entraînement est un moteur (69) possédant un arbre de moteur en connexion avec un boulon fileté (71) qui est connecté à un écrou (73) et l'écrou est connecté au second embrayage (33).

3. Ensemble de serrure à barillet tel que revendiqué à la Revendication 2, où l'actionneur (75) est pris en sandwich entre l'élément d'entraînement (69) et le dispositif de couplage.

4. Ensemble de serrure à barillet tel que revendiqué à la Revendication 1, où l'élément d'entraînement (69) est une vanne électromagnétique en connexion avec un boulon fileté (71) qui est connecté à un écrou (73).

5. Ensemble de serrure à barillet tel que revendiqué à la Revendication 3 comprenant en outre un siège conducteur (67) pour recevoir de manière séquentielle dans celui-ci la carte de circuit imprimé maîtresse (91), l'élément d'entraînement (69) et l'actionneur (75), le siège conducteur étant connecté électriquement au dispositif de détection (39) et à la carte de circuit imprimé maîtresse (91).

6. Ensemble de serrure à barillet tel que revendiqué à la Revendication 1, où le premier anneau de rotation (47) et le second anneau de rotation (53) sont pris en sandwich entre le premier coussinet de rotation (41) et le second coussinet de rotation (59) et le premier coussinet de rotation (41) se met en prise avec un élément d'appui (23) dans le noyau de serrure (7).

7. Ensemble de serrure à barillet tel que revendiqué à la Revendication 6, où le premier anneau de rotation (47) possède l'élément de détection de mise en prise (51), le premier embrayage (25) possède un renfoncement (31), et l'élément de détection de mise en prise (51) est reçu dans le renfoncement (31) de manière à ce que lorsque le premier embrayage (25) est déplacé, l'élément de détection de mise en prise (51) soit déplacé pour se mettre en prise avec la seconde bille conductrice (57).

8. Ensemble de serrure à barillet tel que revendiqué à la Revendication 1 possédant en outre un avertisseur (95) connecté électriquement à la carte de circuit imprimé maîtresse (91).

9. Ensemble de serrure à barillet tel que revendiqué à la Revendication 1, où la source d'énergie est une batterie (93).

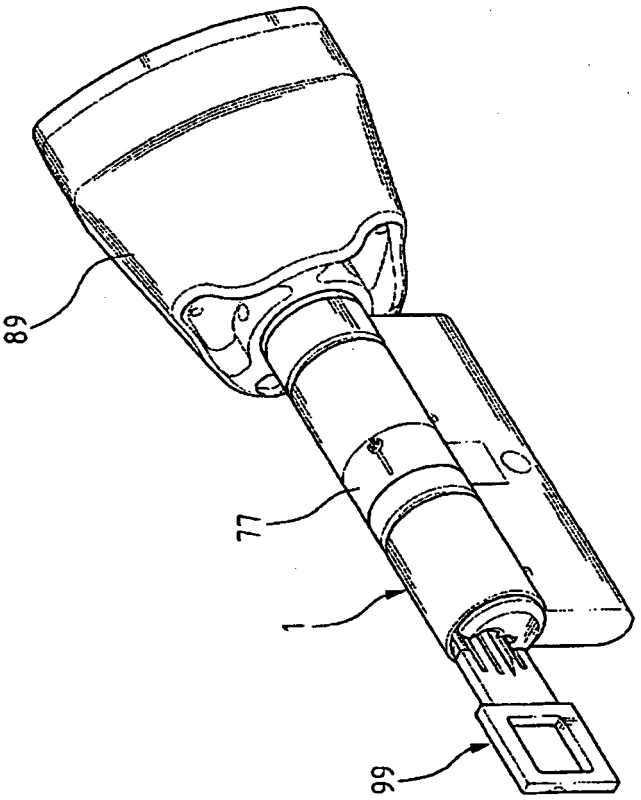


FIG. 1

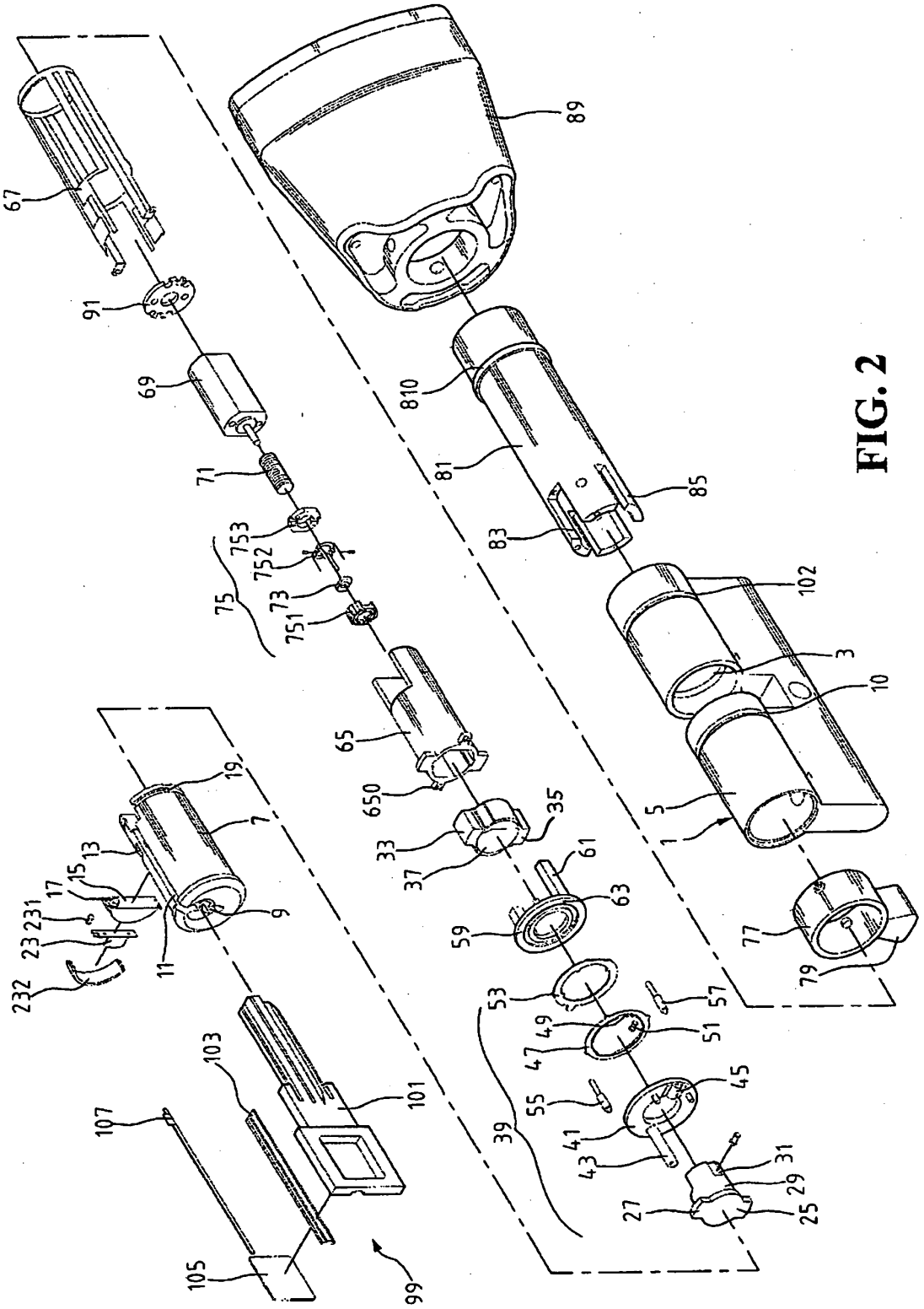

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FIG. 2

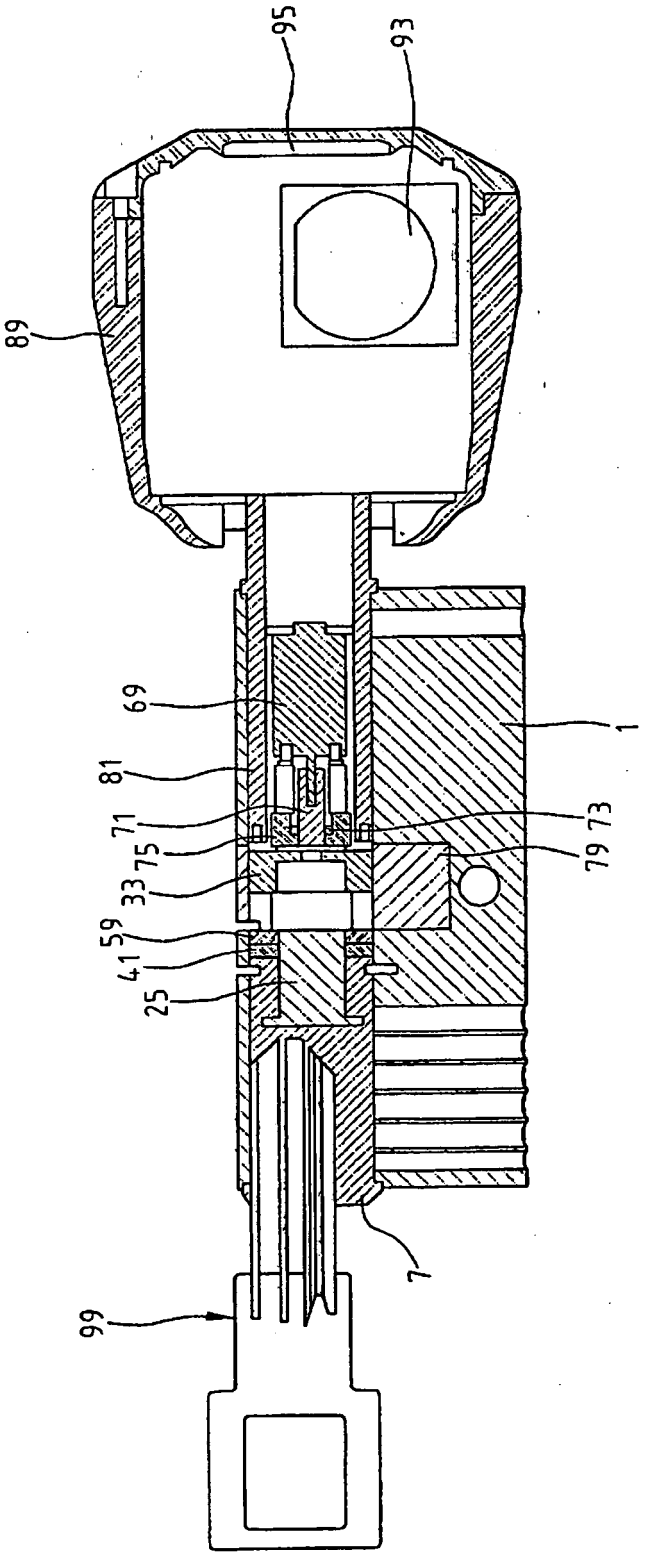


FIG. 3

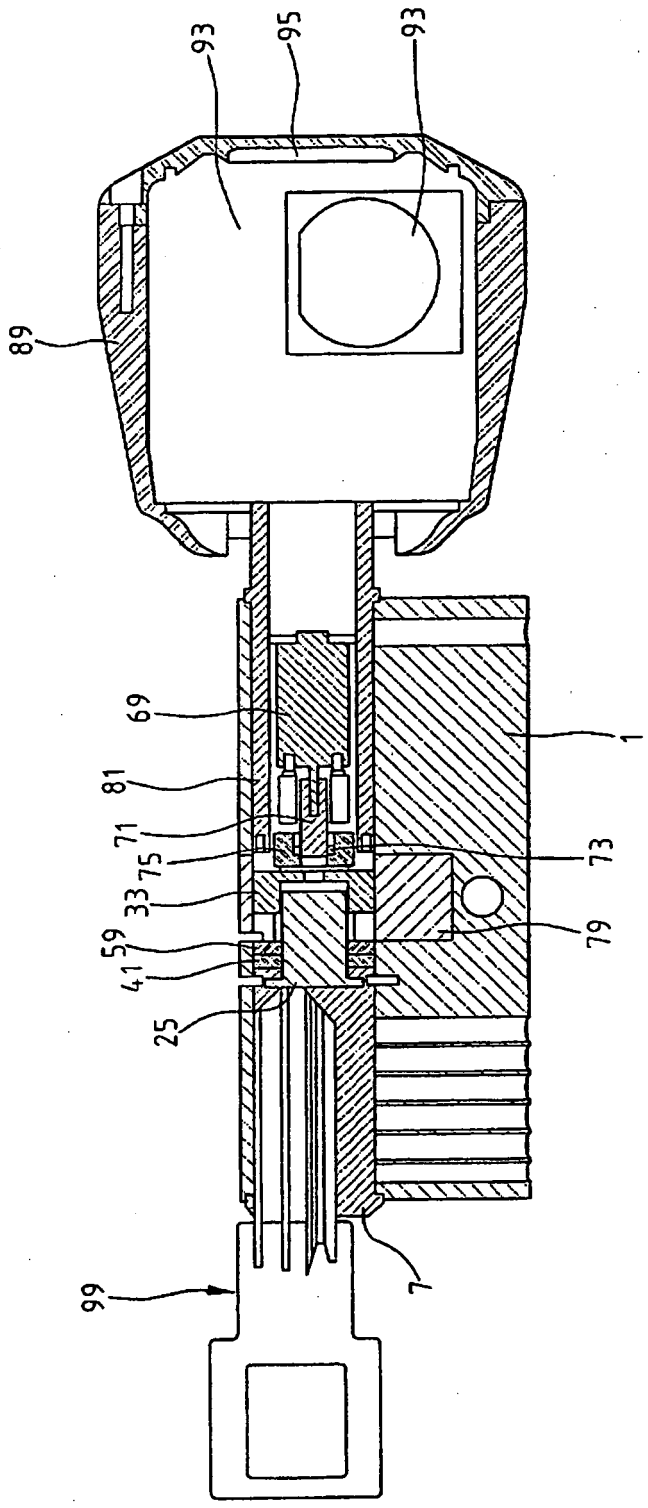


FIG. 4

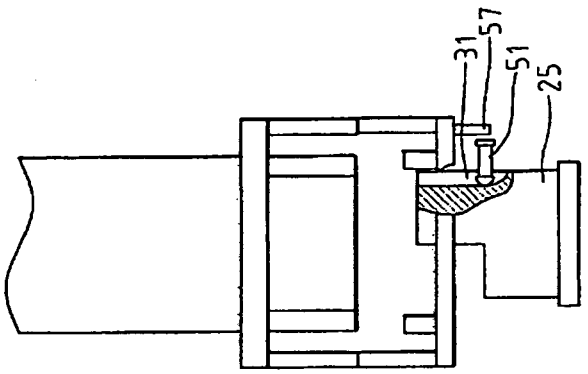


FIG. 5

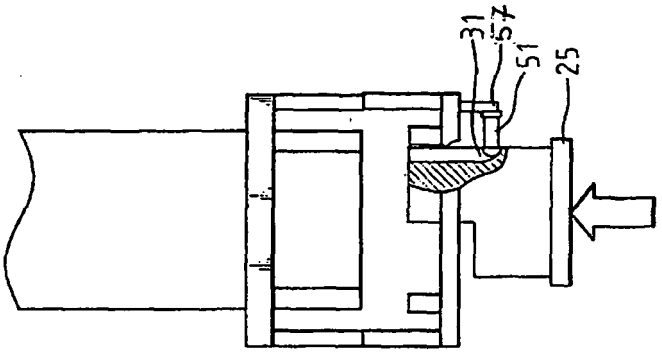


FIG. 6

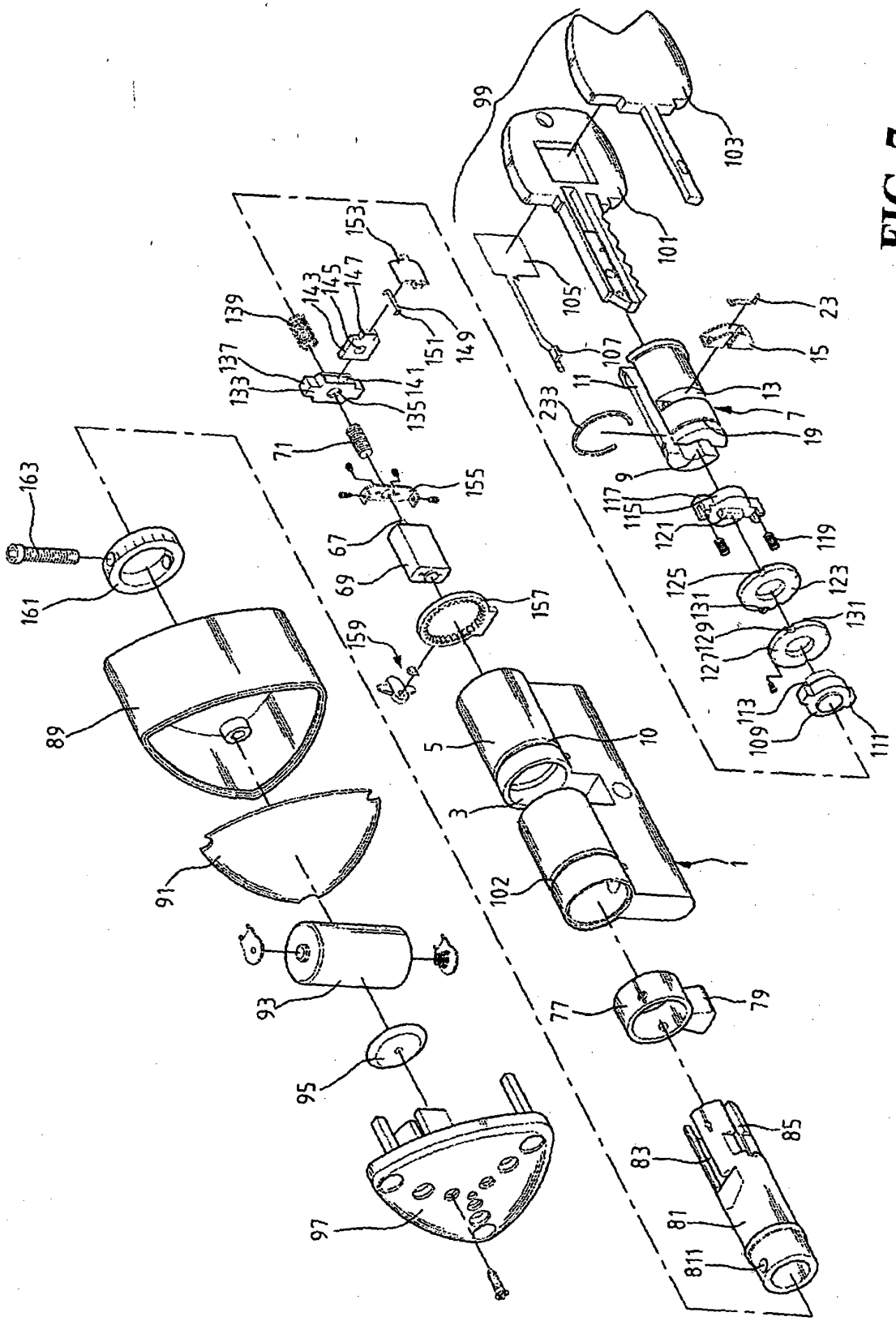

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FIG. 7

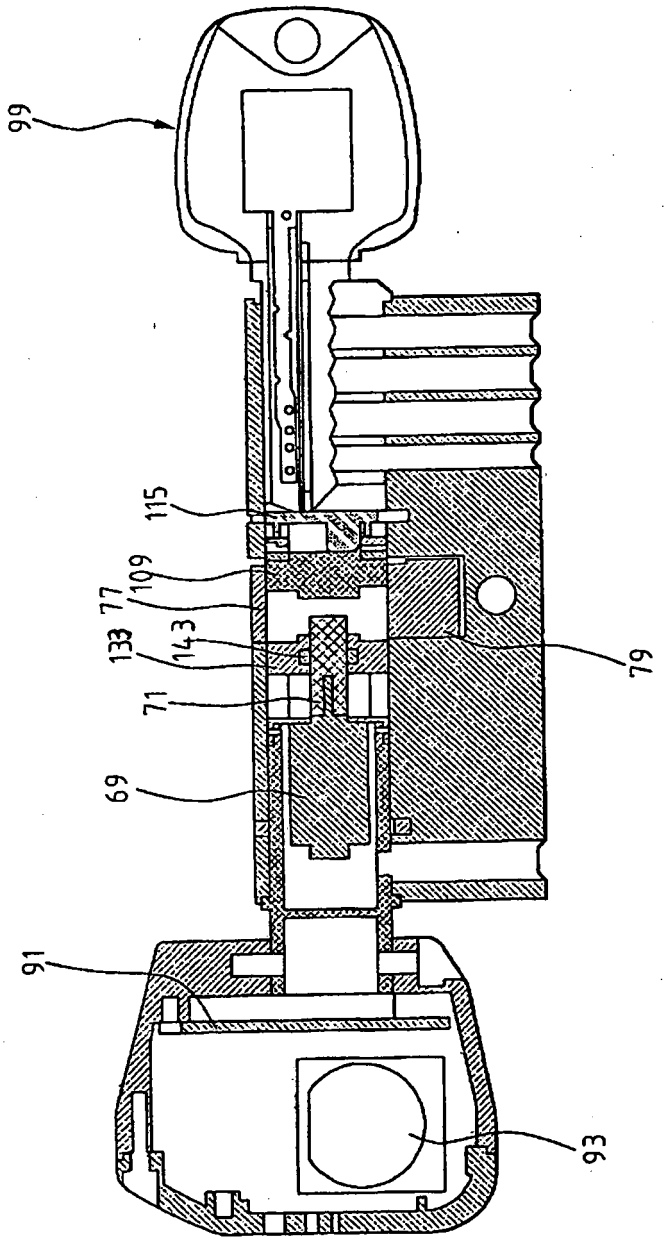


FIG. 8

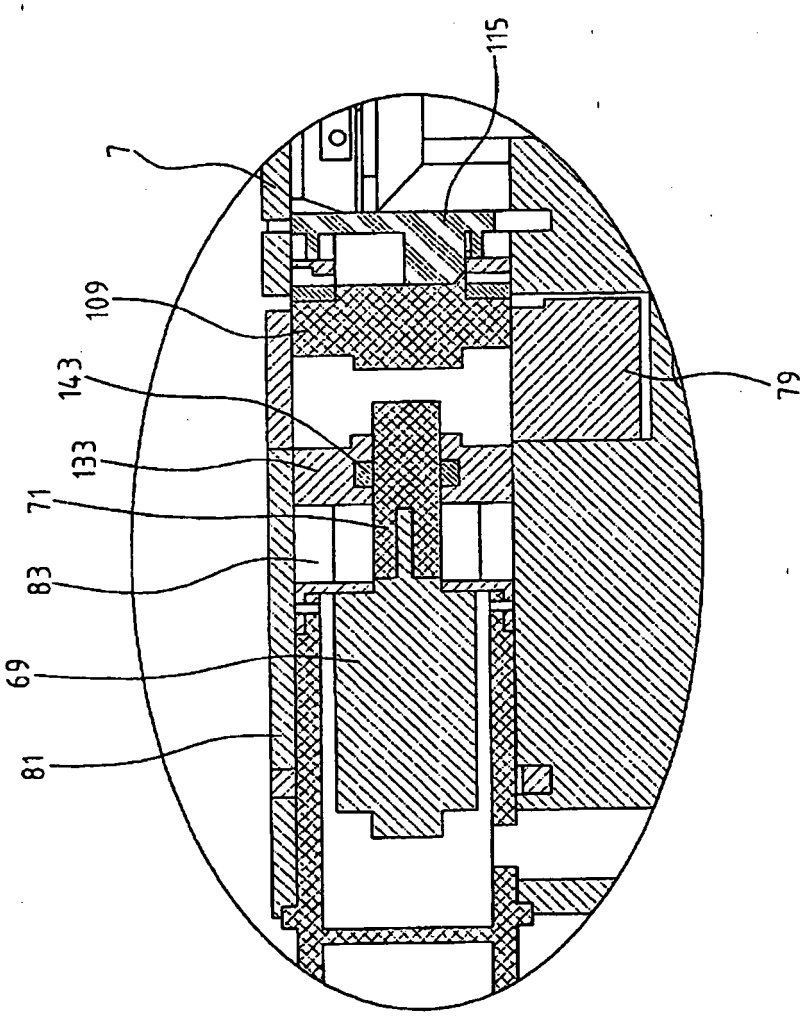


FIG. 9

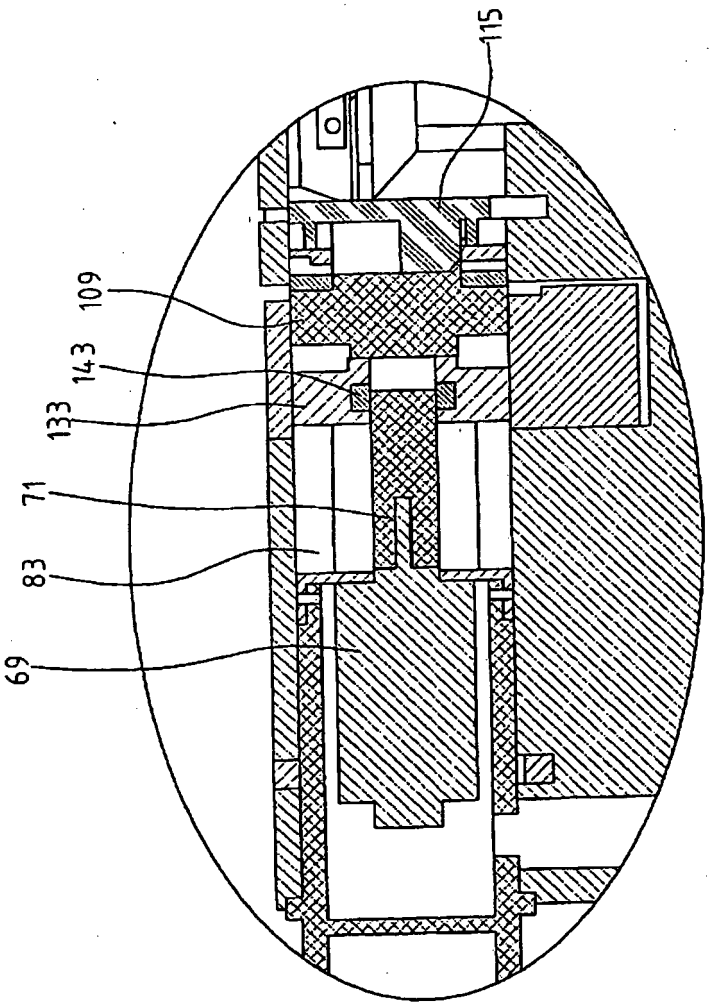


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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