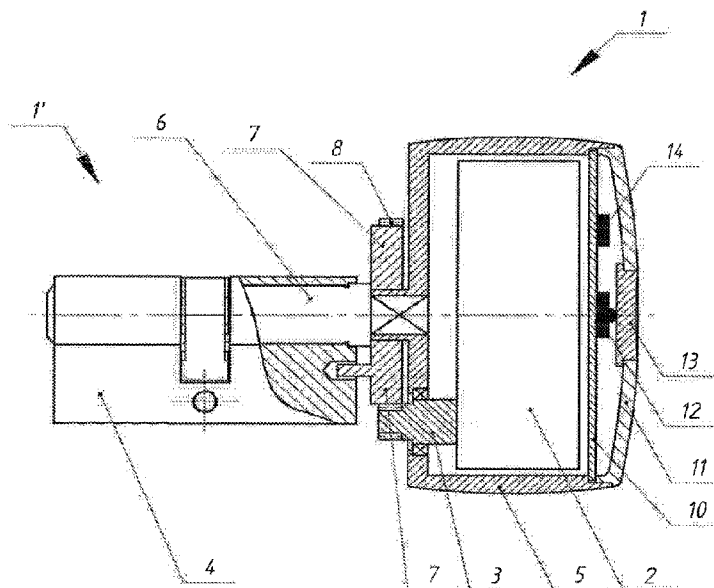




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(54) **Titre : DISPOSITIF D'ENTRAINEMENT POUR DEVERROUILLER ET VERROUILLER UNE SERRURE**  
(54) **Title: DRIVING DEVICE FOR UNLOCKING AND LOCKING A LOCK**



(57) **Abrégé/Abstract:**

Driving device (1) for unlocking and locking a lock (1') enabling access to protected areas, comprising a driving assembly (2) comprising a source of current, an electric motor and a gear assembly terminated in a toothed wheel (3) and arranged in a rotary housing (5), wherein the lock (1') has a body (4) in which a control element (6) of the lock (1') is seated rotatably, is characterized in that the housing (5) is seated in a bearing in the body (4) of the lock (1') by means of the control element (6), to which the housing is connected in a fixed manner, and the driving device (1) is fitted with a ring (7) with teeth (8) to cooperate with the toothed wheel (3) of the driving assembly (2), seated in a bearing rotatably with respect to the housing (5), wherein the ring (7) is arranged coaxially with the rotary housing (5) and in a fixed manner with respect to the body (4) of the lock (1').

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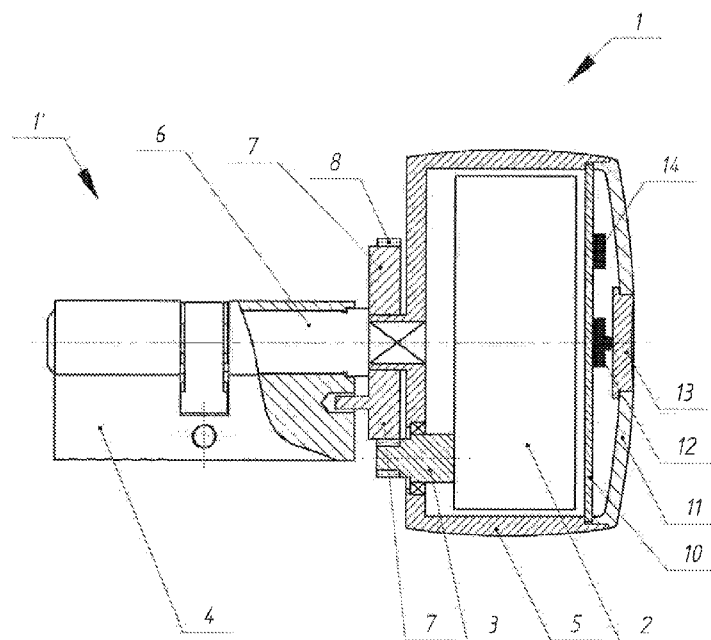


Fig. 1

(57) Abstract: Driving device (1) for unlocking and locking a lock (1') enabling access to protected areas, comprising a driving assembly (2) comprising a source of current, an electric motor and a gear assembly terminated in a toothed wheel (3) and arranged in a rotary housing (5), wherein the lock (1') has a body (4) in which a control element (6) of the lock (1') is seated rotatably, is **characterized in that** the housing (5) is seated in a bearing in the body (4) of the lock (1') by means of the control element (6), to which the housing (5) is connected in a fixed manner, and the driving device (1) is fitted with a ring (7) with teeth (8) to cooperate with the toothed wheel (3) of the driving assembly (2), seated in a bearing rotatably with respect to the housing (5), wherein the ring (7) is arranged coaxially with the rotary housing (5) and in a fixed manner with respect to the body (4) of the lock (1').



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### **Driving device for unlocking and locking a lock**

The subject matter of the invention is a driving device for unlocking and locking a lock enabling access to protected areas, and in particular to so called “intelligent locks”, the unlocking or locking of which may be effected without the authorised person directly contacting the lock.

A known driving device for unlocking and locking a lock enabling access to protected areas, has a driving assembly for driving the lock, within a housing in a form of a bush secured from the outside at one side with a cover and at the other side with a base , with driving assembly components fixed thereto or seated therein. The driving assembly comprises a current generator, electric motor and a gear assembly.

The current generator are four cylindrical primary cells (batteries) placed next to the motor parallel to the motor's axis.

The motor is powered by batteries.

The driving power from the electric motor is transmitted via the gear assembly, consisting of toothed wheels, to a component used to control the lock.

The base has an opening through which passes a control element of the lock, and the second end of this element is connected to the lock mechanism.

The bush, being the housing of the driving device, has teeth at the inside, the teeth cooperating with one of the toothed wheels of the gear assembly of the driving assembly. The driving device is fitted with an electronic control unit which controls the driving assembly. It is placed between the cover and the motor. The electronic control unit is powered by batteries placed in the housing. The electronic control unit may be controlled wirelessly by means of computer software, preferably a mobile device application, via a wireless connection. The device does not require external power supply and can be controlled by means of a smartphone application.

The driving device is installed from the inside of an apartment, in all door types with a profile insert. The so-designed driving device for unlocking a lock is quite large in size because of the size of the power supply batteries and the size of the other

components of the driving mechanism which must be enclosed within the housing of the device.

From Polish application P.336314, a driving device for a lock is known. The driving device, fixed on the door in a form of a plate fitting, for the motor-driven and manual actuation of a locking cylinder, has a drive shaft for transmitting rotation to the locking cylinder, a knob for manually turning the drive shaft, and a gear motor arranged in the knob for the motor-driven rotation of the drive shaft. A driving toothed wheel is seated on the drive shaft non-rotatably and is connected with the knob such that it transmits torque. The gear motor is coupled to the plate fitting non-rotatably and to the driving toothed wheel by means of a clutch when current is applied.

From German patent application DE102014009826A1 a device for unlocking and locking entrances to access-protected areas is known. The device has a cylindrical housing. The housing encloses a base plate, miniature motor, preferably a direct current motor, electric battery, blocking assembly and control unit. The blocking element of the blocking assembly is a rod with a ring, the rod moved by an electric motor via a torsion spring capable to transmit motion from the motor to the rod. The electric battery is to provide power supply to the control system irrespective of power supplied to the device via an external power supply line. The control unit is controlled via a wireless connection.

The objective of the invention is to develop a new driving device for unlocking and locking a lock, being of simple design, and to provide a new solution type.

The driving device of the invention for unlocking and locking a lock enabling access to protected areas comprises a driving assembly comprising a source of electric current, an electric motor and a gear assembly terminating in a toothed gear, arranged in a rotary housing. The lock has a body, in which a control element of the lock is seated rotatably. The driving device is characterised in that the housing is seated in a bearing in the body of the lock by means of a control element, to which the housing is connected in a fixed manner, and the driving device is fitted with a ring with teeth to cooperate with the toothed wheel of the driving assembly, the toothed wheel seated in a bearing rotatably with respect to the housing. The ring is placed coaxially with the rotary housing and in a fixed manner with respect to the body of the lock. The ring is seated in a bearing in the rotary housing.

It is preferred that the teeth of the ring are inner teeth.

It is also preferred that the teeth of the ring are outer teeth.

It is further preferred that the housing is connected to the control element by means of a shaped releasable connection.

It is additionally preferred that the housing together with the control element are a monolith.

It is also preferred that the ring is connected with the body of the lock by means of a screw.

It is further preferred that the ring is connected with the body of the lock by means of a shaped connection.

It is also preferred that the driving device is fitted with an electronic control unit to control the driving assembly.

It is further preferred that the electronic control unit is fitted with a first sensor and a manual control button cooperating therewith, arranged on the frontal part of the driving device.

It is additionally preferred that the electronic control unit is fitted with a second sensor which establishes angular position of the rotary housing.

It is additionally preferred that the second sensor is an accelerometer (gravity sensor).

It is further preferred that the electronic control unit is controlled wirelessly.

It is more preferred that the electronic control unit is controlled wirelessly by means of computer software, preferably a mobile device application, via a wireless connection.

It is also more preferred that the electronic control unit is controlled wirelessly via a Bluetooth wireless connection.

It is further preferred that the electronic control unit is fitted with a micro USB socket intended to deliver supply voltage and to transfer data.

It is additionally preferred that the driving device is fitted with an electric energy source in a form of a primary or secondary cell.

It is also preferred that the driving device is arranged at the inner side of an entrance to access-protected areas and on the opposite side to the key-controlled part of the lock.

### BRIEF DESCRIPTION OF THE DRAWINGS

The subject-matter of the invention is shown in embodiments in the drawing, wherein:

Fig. 1 shows a longitudinal section of a driving device for unlocking and locking a lock, in a variant with a ring having outer teeth, and

Fig. 2 shows a longitudinal section of a driving device for unlocking and locking a lock, in a variant with a ring having inner teeth.

### DETAILED DESCRIPTION

As shown in the embodiments of the invention in Fig. 1 and Fig. 2, a driving device 1 for unlocking and locking a lock 1', the lock 1' enabling access to protected areas, comprises a driving assembly 2 arranged within a rotary housing 5. The lock 1' has a body 4, in which a control element 6 of the lock 1' is seated rotatably. The housing 5 is connected in a fixed manner to the control element 6 and is seated in a bearing in a body 4 of the lock 1' by means of a control element 6.

The driving assembly 2, arranged within the housing 5, usually comprises an electric driving motor, reduction toothed gear and an energy source in a form of an electric cell. It may also be fitted with a clutch. The structure of the driving mechanism 2, being irrelevant to the concept of the invention, is not shown in the drawing.

As shown in the embodiments of the invention in Fig. 1 and Fig. 2, the driving assembly 2 is fitted with a toothed wheel 3 (one of the wheels of the toothed gear), which is seated in a bearing rotatably with respect to the housing 5.

As shown in Fig. 1 and Fig. 2, the housing 5 is connected to the control element 6 by means of a shaped releasable connection. It is clear that in other embodiments of the invention, the housing 5 may be connected to the control element 6 in another known way which provides a fixed connection of the housing 5 to the control element 6. In a specific case, the housing 5 together with the control element 6 may be a monolith.

The driving device 1 is fitted with a ring 7 with teeth 8 to cooperate with the toothed wheel 3 of the driving assembly 2. The ring 7 is placed coaxially with the rotary housing 5 and in a fixed manner with respect to the body 4 of the lock 1'.

In the embodiment of the invention shown in Fig. 1, the teeth 8 of the ring 7 are outer teeth and the ring 7 is seated in a bearing in the housing 5 and connected to the body 4 of the lock 1' by means of a shaped connection.

In the embodiment of the invention shown in Fig. 2, the teeth 8 of the ring 7 are inner teeth and the ring 7 is connected to the body 4 of the lock 1' by means of a screw 9.

It is clear that in other embodiments of the invention, the ring 7 may be connected to the body 4 of the lock 1' in another known way which provides a fixed connection of the ring 7 to the body 4 of the lock 1, for example by means of rivets and glueing. In a specific case, the ring 7 together with the body 4 of the lock 1' may be a monolith.

As shown in the embodiments of the invention in Fig. 1 and Fig. 2, the driving device 1 is fitted with an electronic control unit 10 which controls the driving assembly 2. The electronic control unit 10 is arranged within the housing 5, between the driving assembly 2 and the frontal part 11, and is fitted with a first sensor 12, placed in the central part of the electronic control unit 10. The first sensor 12 cooperates with a manual control button 13 arranged on the frontal part 11 of the driving device 1 and enables manual

actuation of unlocking or locking of the door. The electronic control unit 10 is also fitted with a second sensor 14 which establishes angular position of the rotary housing 5. The second sensor 14, in the embodiments of the invention shown in Fig. 1 and Fig. 2, is an accelerometer (a sensor that establishes angular position of the rotary housing with respect to the gravitational field of the Earth) and is arranged on the electronic control unit 10.

The electronic control unit 10 is controlled wirelessly by means of computer software, preferably a mobile device application, via a wireless connection.

It is also clear that the electronic unit 10 may be controlled wirelessly via a Bluetooth wireless connection.

Electronic control unit 10 is fitted with a micro USB socket (not shown) to deliver supply voltage and to transfer data.

The driving device 1 is fitted with an electric energy source in a form of a primary or secondary cell.

The driving device 1 is arranged at the inner side of an entrance to access-protected areas and on the opposite side to the key-controlled part of the lock 1'.

Pressing the manual control button 13 causes unlocking of the locked lock 1' or locking of the unlocked lock 1', preferably with a delay. The second sensor 14 transmits information on the position of the housing 5 to the electronic control unit 10 and to the mobile device of the person controlling the driving device 1, whereby the person has information on unlocking or locking of the lock 1'.

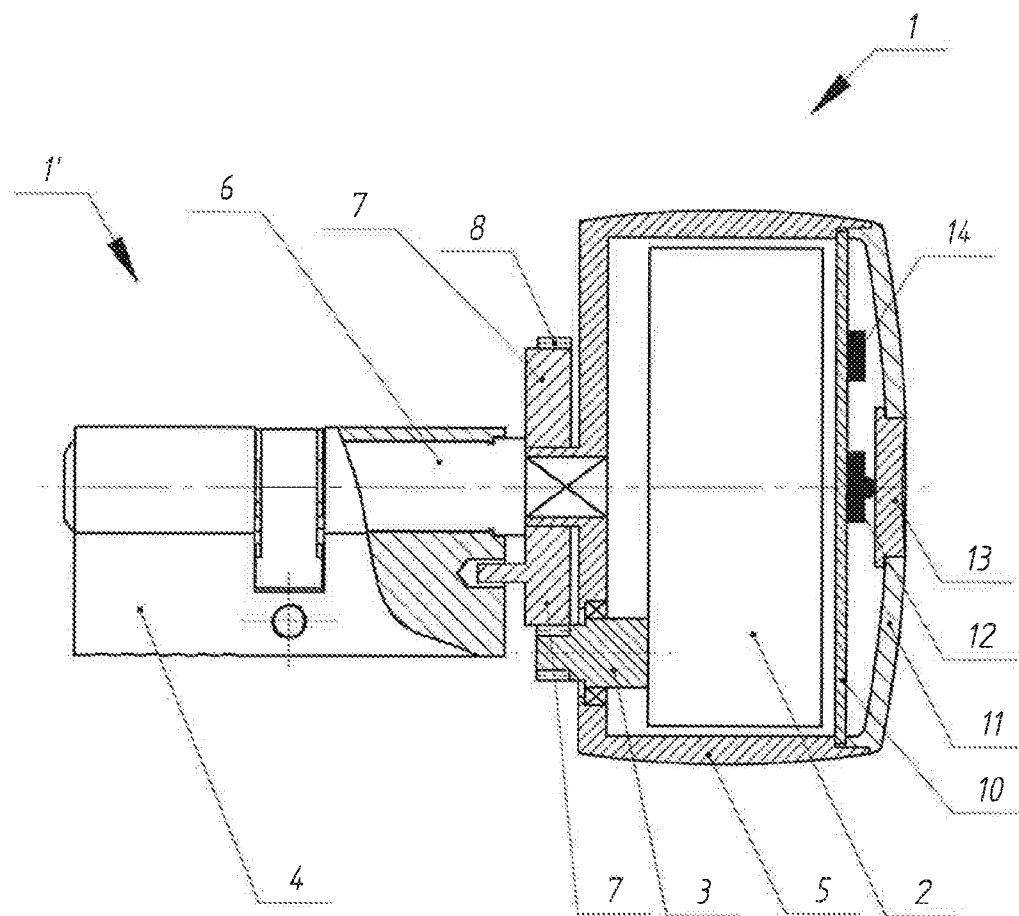
In the solution being the driving device 1 of the invention for unlocking and locking the lock 1', the housing 5 is connected in a rigid (fixed) manner to a control element 6, with the control element 6 being seated in a bearing in the body of the lock 1'. In this solution, the control element 6 of the lock 1' transmits both the torque from the driving mechanism 2 and the transverse and axial forces, which is why any other

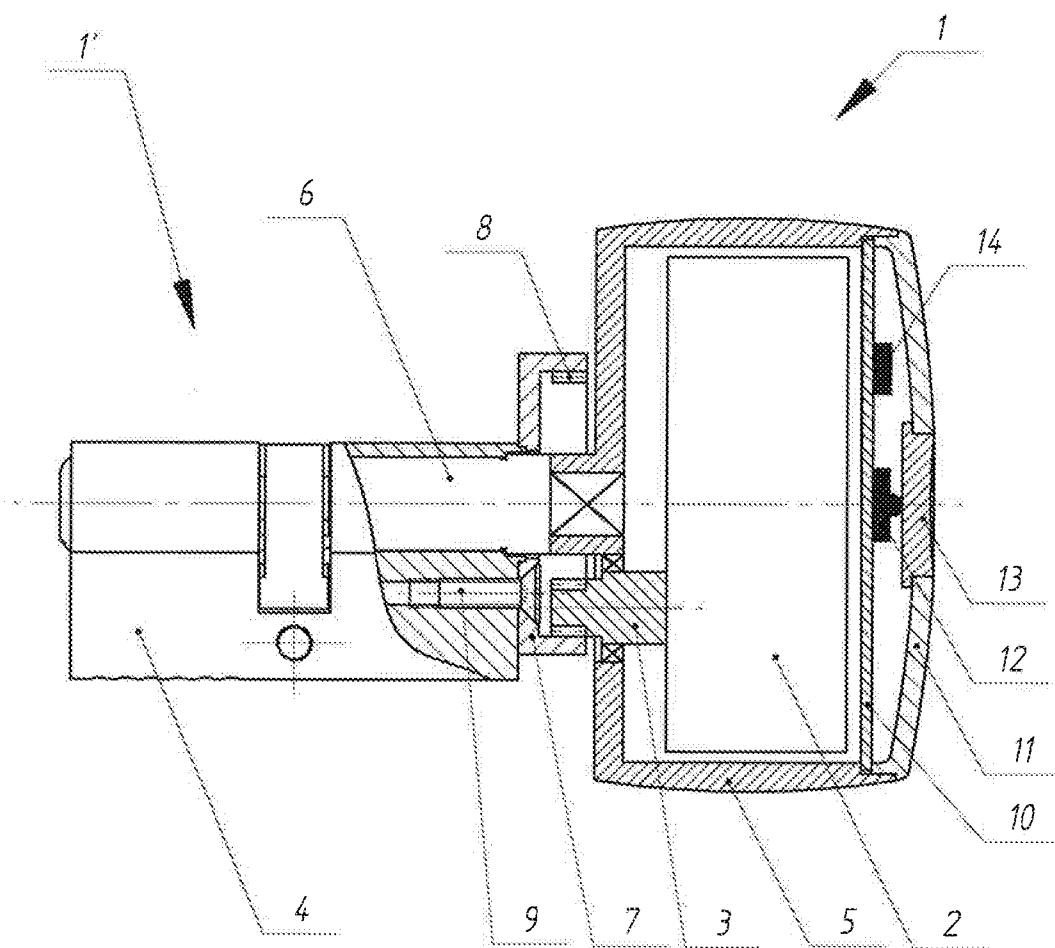
bearing of the housing 5 of the driving device 1 with respect to the body 4 of the lock 1' is unnecessary. The only bearing of the housing 5 of the driving device 1 is the control element 6 of the lock 1', which provides the idea of the driving device 1 of the invention.

### Claims

1. Driving device (1) for unlocking and locking a lock (1') enabling access to protected areas, comprising a driving assembly (2) comprising a source of current, an electric motor and a gear assembly terminated in a toothed wheel (3), and arranged in a rotary housing (5), wherein the lock (1') has a body (4), in which a control element (6) of the lock (1') is seated rotatably, wherein the housing (5) is seated in a bearing in the body (4) of the lock (1') by means of a control element (6) to which the housing is connected in a fixed manner, and the driving device (1) is fitted with a ring (7) with teeth (8) cooperating with the toothed wheel (3) of the driving assembly (2), the toothed wheel seated in a bearing rotatably with respect to the housing (5), and the ring (7) is arranged coaxially with the rotary housing (5) and in a fixed manner with respect to the body (4) of the lock (1'), **characterised in that** the ring (7) is seated in a bearing in the rotary housing (5).
2. Driving device of claim 1, **characterized in that** the teeth (8) of the ring (7) are inner teeth.
3. Driving device of claim 1, **characterized in that** the teeth (8) of the ring (7) are outer teeth.
4. Driving device of claim 1, **characterized in that** the housing (5) is connected to the control element (6) by means of a shaped releasable connection.
5. Driving device of claim 1, **characterized in that** the housing (5) together with the control element (6) is a monolith.
6. Driving device of claim 1, **characterized in that** the ring (7) is connected to the body (4) of the lock (1') by means of a screw (9).
7. Driving device of claim 1, **characterized in that** the ring (7) is connected to the body (4) of the lock (1') by means of a shaped connection.

8. Driving device of claim 1, **characterized in that** it is fitted with an electronic control unit (10) which controls the driving assembly (2).
9. Driving device of claim 8, **characterized in that** the electronic control unit (10) is fitted with a first sensor (12) and a manual control button (13) cooperating with the first sensor, the manual control button being arranged on the frontal part (11) of the driving device (1).
10. Driving device of claim 8, **characterized in that** the electronic control unit (10) is fitted with a second sensor (14) which establishes angular position of the rotary housing (5).
11. Driving device of claim 10, **characterized in that** the second sensor (14) is an accelerometer (gravity sensor).
12. Driving device of claim 8, **characterized in that** the electronic control unit (10) is controlled wirelessly.
13. Driving device of claim 12, **characterized in that** the electronic control unit (10) is controlled wirelessly by means of computer software, preferably a mobile device application, via a wireless connection.
14. Driving device of claim 12, **characterized in that** the electronic control unit (10) is controlled wirelessly via a Bluetooth wireless connection.
15. Driving device of claim 8, **characterized in that** the electronic control unit (10) is fitted with a micro USB socket intended to deliver supply voltage and to transfer data.
16. Driving device of claim 1, **characterized in that** it is fitted with an electric energy source in a form of a primary or secondary cell.
17. Driving device of claim 1, **characterized in that** it is arranged at the inner side of an entrance to access-protected areas and on the opposite side to the key-controlled part of the lock (1').

*Fig. 1*

*Fig. 2*

