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(54) AN ELECTRICAL LOCK SUITABLE FOR ATTACHMENT TO A FENCE GATE

(57) A battery powered electrical lock the lock comprising

• a battery powered locking mechanism for locking a handle shaft follower, and

• a battery box arranged for receiving at least one battery through a battery box access opening and for interconnecting the opposite poles of the at least one battery to a powering circuit, which powering circuit interconnects the battery box and the battery powered locking mechanism,

wherein the lock comprises a first pivot shaft mounted on the frame such as to extend along an axis lying in a separation plane substantially perpendicular to the door thickness direction, and in that the battery box is pivotally supported by the first pivot shaft such as to enable the pivoting of the battery box between an inner angular position wherein the access opening of the battery box lies on a first side of the separation plane referred to as the inner side of the separation plane, and an outer angular position wherein the access opening of the battery box lies on the opposite side of the separation plane referred to as the outer side of the separation plane, such that in the inner angular position of the battery box, the access opening of the battery box is more easily accessible from the inner side of the separation plane than from the outer side of the separation plane, and wherein the lock comprises an inner and an outer keypad, wherein inner and outer keypad are attached to the frame in such a manner that the inner keypad is arranged as a lid for the battery box access opening in the inner angular position, and in such a manner that the outer keypad is arranged as a lid for the battery box access opening in the outer angular position.

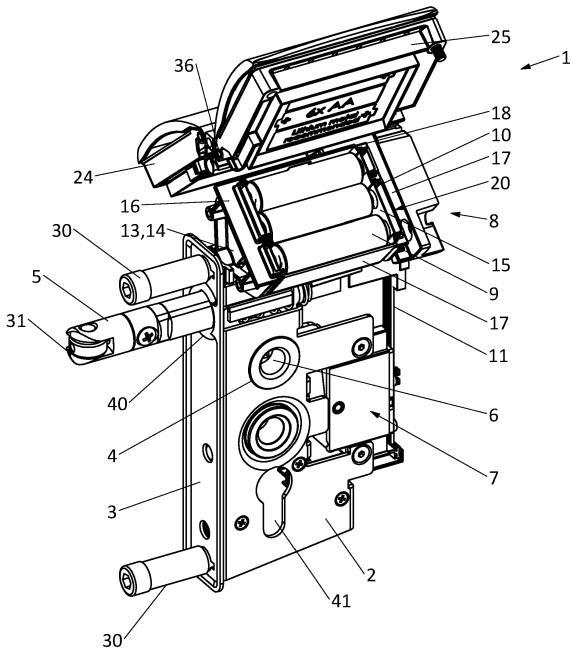

Fig.1

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Description

Technical field

[0001] The present invention relates to an electrical lock suitable for attachment to a fence gate.

Background

[0002] Electrical locks suitable for attachment to a fence gate are known in the prior art such as from patent publication EP1526235. This patent publication discloses an electrical lock comprising a frame comprising a base plate and a side plate, wherein the base plate comprises a follower opening for receiving a handle shaft follower, and wherein the side plate comprises a latch bolt opening for receiving a latch bolt, the frame having mounted thereon the following elements:

- A latch bolt extending along a door width direction through the latch bolt opening. In practice, the door width direction is the width direction of the fence gate on which the electrical lock is installed. The latch bolt is movably mounted on the frame between a locking and an unlocking position at least by means of a handle.

- A handle shaft follower provided in the follower opening, the handle shaft follower comprising a handle shaft channel extending along an axis in a door thickness direction for receiving a handle shaft for said handle. In practice, the door thickness direction is the thickness direction of the fence gate on which the electrical lock is installed. The handle shaft follower is pivotally mounted around its axis in the door thickness direction on the frame between a first and a second angular position such that in use the handle shaft follower rotates between the first and the second angular position upon rotation of the handle shaft between the first and the second angular position.

- A mechanism for actuating the latch bolt upon rotation of the handle shaft follower to move the latch bolt from its locking to its unlocking position when the handle shaft follower is rotated from its first angular position to its second angular position and to move the latch bolt from its unlocking to its locking position when the handle shaft follower is rotated from its second angular position to its first angular position.

- An electrically powered locking mechanism for locking the handle shaft follower, which locking mechanism is arranged to be brought in two states, namely in a locking state wherein the handle shaft follower is locked in its first angular position and in an unlocking state wherein the handle shaft follower is unlocked.

[0003] It is an aim of the present invention to provide a battery powered electrical lock. It has been found by the present inventors that providing a fence gate with a battery powered electric lock posed the problem that the batteries, which must be easily accessible to the user for timely replacement thereof, could easily be stolen by vandals, in particular when said access to the batteries is provided at the side of the electrical lock that gives out on the public side of the fence gate, i.e. on the outside of the area enclosed by the fence. Rotating the electrical lock over 180° around the door height direction would provide said access to the batteries on the safer private side of the fence gate, i.e. on the inside of the area enclosed by the fence. This rotation is however not possible with conventional electric locks. Some locks are reversible locks, i.e. suitable to be attached to a fence gates hinged at its right side or at its left side, for example by providing a reversible beveled latch bolt. The rotation of the lock over 180° around the door height direction would be possible with such reversible locks under the condition that the fence gate is changed from a left hinged to a right hinged fence. It might however not be desired or structurally possible to change the hinged side of the fence gate.

Description of the invention

[0004] The present invention aims to provide a battery powered electrical lock suitable for attachment to a turning fence gate wherein the risk of battery theft is drastically reduced. The present invention therefore provides a battery powered electrical lock suitable for attachment to a turning fence gate according to the first claim. The electrical lock therefore comprises a frame comprising a base plate and a side plate, wherein the base plate comprises a follower opening for receiving a handle shaft follower, and wherein the side plate comprises a latch bolt opening for receiving a latch bolt. The frame has mounted thereon the following elements:

- A latch bolt extending along a door width direction through the latch bolt opening. In practice, the door width direction is the width direction of the fence gate on which the electrical lock is installed. The latch bolt is movably mounted on the frame between a locking and an unlocking position at least by means of a handle.
- A handle shaft follower provided in the follower opening, the handle shaft follower comprising a handle shaft channel extending along an axis in a door thickness direction for receiving a handle shaft for said handle. In practice, the door thickness direction is the thickness direction of the fence gate on which the electrical lock is installed. The handle shaft follower is pivotally mounted around its axis in the door thickness direction on the frame between a first and a second angular position, such that in use the handle shaft follower rotates between the first and the

second angular position upon rotation of the handle shaft between the first and the second angular position.

- A mechanism for actuating the latch bolt upon rotation of the handle shaft follower to move the latch bolt from its locking to its unlocking position when the handle shaft follower is rotated from its first angular position to its second angular position and to move the latch bolt from its unlocking to its locking position when the handle shaft follower is rotated from its second angular position to its first angular position.
- A battery powered locking mechanism for locking the handle shaft follower, which locking mechanism is arranged to be brought in two states, namely in a locking state wherein the handle shaft follower is locked in its first angular position and in an unlocking state wherein the handle shaft follower is unlocked.
- A battery box arranged for receiving at least one battery through a battery box access opening and for interconnecting the opposite poles of the at least one battery to a powering circuit, which powering circuit interconnects the battery box and the battery powered locking mechanism.

[0005] According to the present invention, the battery box is pivotally mounted on the frame around a first pivot axis lying in a separation plane substantially perpendicular to the door thickness direction such as to enable the pivoting of the battery box between an inner angular position wherein the access opening of the battery box lies on a first side of a separation plane referred to as the inner side of the separation plane, and an outer angular position wherein the access opening of the battery box lies on the opposite side of the separation plane referred to as the outer side of the separation plane, such that in the inner angular position of the battery box, the access opening of the battery box is accessible from the inner side of the separation plane and not accessible from the outer side of the separation plane. In practice, the separation plane lies within and parallel to the fence gate. In practice, the inner side of the separation plane corresponds to the safe private side of the fence gate, i.e. the side of the fence gate lying within the area enclosed by the fence. In practice, the outer side of the separation plane corresponds to the unsafe public side of the fence gate, i.e. the side of the fence gate lying outside of the area enclosed by the fence e.g. the side that is accessible by the public. Preferably, the lock further comprises an inner and an outer support plate configured for supporting a keypad, wherein the inner and outer support plate are attached to the frame in such a manner that the inner support plate is arranged as a lid for the battery box access opening in the inner angular position, and in such a manner that the outer support plate is arranged as a lid for the battery box access opening in the outer angular position. Preferably, the rotation of the battery box from the inner angular position to the outer angular position is prevented by the inner and/or outer support plate when they are a lid closing the access opening of the battery box as described above.

[0006] The electrical lock of the present invention has the advantage that the batteries can be switched from the unsafe side of the fence gate to the safe side of the fence gate without requiring to purchase a new lock or to change the hinged side of the fence gate, thereby ensuring that the batteries are easily accessible from a safe side of the fence gate whilst being difficultly accessible from an unsafe side of the fence gate.

[0007] According to an embodiment of the present invention the electrical lock is a reversible lock, i.e. configured to be installed on right and left turning fence gates or on fence gates hinged at the left or right side, for example by providing a reversible beveled latch bolt.

[0008] According to an embodiment of the present invention, the channel of the handle shaft follower has a shape in a cross-section with a plane perpendicular to the door thickness direction, which shape substantially corresponds to the shape of the handle shaft taken in a cross-section with a plane perpendicular to the door thickness direction. Preferably, the above mentioned shape of the handle shaft follower channel is non-circular, preferably rectangular. This embodiment ensures that the rotation of the handle shaft, for example upon actuation of the handle, results in the rotation of the handle shaft follower. According to an embodiment of the present invention, the handle shaft is part of the electrical lock, i.e. the handle shaft is inserted in the handle shaft channel of the handle shaft follower.

[0009] According to an embodiment of the present invention, the battery box comprises a container having a bottom wall and upstanding sidewalls. Preferably, the upstanding sidewalls enclose an opening, wherein said opening it the access opening of the battery box. Preferably, the battery box further comprises a battery box holder extending between an upper end and a lower end. Preferably, the battery box container is provided on the upper end of the battery box holder. Preferably, the battery box holder and the batter box container are integrally formed, i.e. together form a single piece. Preferably, the upstanding sidewalls of the battery box container are provided with springs for clamping the at least one battery. Preferably, the battery box holder is pivotally mounted on the frame, around the first pivot axis, at its lower end, such that the first pivot axis lies below the battery access opening along the door height direction (i.e. perpendicular to the door width direction and the door thickness direction).

[0010] According to an embodiment of the present invention, the first pivot axis lies below the battery access opening along the door height direction (i.e. perpendicular to the door width direction and the door thickness direction). The present embodiment implies that the battery box is supported on the first pivot axis such that a vector from the first pivot axis to the battery access opening points against the direction of the gravitational accel-

eration vector.

[0011] According to an embodiment of the present invention, the first pivot axis extends substantially along the door width direction, i.e. as opposed to the door thickness direction and/or the door height direction. Preferably, the normal of the bottom plate of the battery box container does not comprise a component along the door width direction if the first pivot shaft extends substantially along the door with direction.

[0012] According to an embodiment of the present invention, both the inner and outer support plate support a keypad, i.e. respectively an inner keypad and an outer keypad. In an alternative embodiment only one of the inner and outer support plate supports a keypad, respectively an inner keypad or an outer keypad. Preferably, the support plates are boxes wherein a keypad is receivable.

[0013] According to an embodiment of the present invention, the keypad i.e. the inner and/or outer keypad, comprises pushbuttons. Preferably, the support plate supporting the keypad comprises an electronic processor for detecting the pushing of the pushbuttons of the keypad. Preferably, the control circuit interconnects the electronic component and the battery powered locking mechanism. According to an embodiment of the present invention, the outer keypad comprises pushbuttons. The outer keypad preferably comprises an outer electronic processor for detecting the pushing of the pushbuttons of the outer keypad, and wherein an outer control circuit interconnects the outer electronic component and the battery powered locking mechanism, preferably such as to actuate the battery powered locking mechanism using the power provided by the battery. According to an embodiment of the present invention, the inner keypad comprises pushbuttons. The inner keypad preferably comprise an inner electronic processor for detecting the pushing of the pushbuttons of the inner keypad, and wherein an inner control circuit interconnects the inner electronic component and the battery powered locking mechanism, preferably such as to actuate the battery powered locking mechanism using the power provided by the battery. According to an embodiment of the present invention, the pushbuttons on the inner keypad comprises a release button, configured to actuate the battery powered locking mechanism upon merely pushing the release button. According to an embodiment of the present invention, the pushbuttons on the outer keypad comprises multiple numerical and/or alphanumerical buttons, configured to actuate the battery powered locking mechanism upon pushing the numerical and/or alphanumerical buttons in a sequence corresponding to a code stored in the outer controller circuit.

[0014] According to an embodiment of the present invention, the keypad, i.e. the inner and/or outer keypad, comprises a cover plate moveably attached to the keypad between an open position in which the keypad is accessible from the side of the separation plane on which the keypad is provided, and a closed position in which the keypad is not accessible from the side of the separation plane on which the keypad is provided. According to an embodiment of the present invention, the outer keypad comprises an outer cover plate moveably attached to the outer keypad between an open position in which the outer keypad is accessible from the outer side of the separation plane, and a closed position in which the outer keypad is not accessible from the outer side of the separation plane. According to an embodiment of the present invention, the inner keypad comprises an inner cover plate moveably attached to inner keypad between an open position in which the inner keypad is accessible from the inner side of the separation plane, and a closed position in which the inner keypad is not accessible from the inner side of the separation plane. The present embodiments have the advantage that they prevent the pushbuttons of the keypads from freezing. This is particularly advantageous in the present invention because the electrical lock is a battery powered electrical lock and not an electrical lock powered by a power grid. In electrical locks powered by a power grid, an electrical heater could be provided in the keypads such as to heat the keypad when the risk of freezing is high. However, providing such an electrical heating in a battery powered electrical lock has the disadvantage that the batteries will be depleted too rapidly, thus more frequently requiring the cumbersome process of replacing the batteries.

[0015] According to an embodiment of the present invention, the inner support plate is pivotally mounted on the frame around a second pivot axis, preferably extending parallel to the first pivot axis, such as to enable the pivoting of the inner support plate between on the one hand a closed angular position wherein the inner support plate covers the battery box access opening when the battery box is in the inner angular position such as to prevent access to the battery box access opening from the inner side of the separation plane and on the other hand an open angular position wherein the inner support plate enables the access to the battery box access opening from the inner side of the separation plane when the battery box is in the inner angular position. Preferably, the outer support plate is pivotally mounted on the frame around a third pivot axis, preferably extending parallel to the first and second pivot axis, such as to enable the pivoting of the outer support plate between on the one hand a closed angular position wherein the outer keypad covers the battery box access opening when the battery box is in the outer angular position such as to prevent access to the battery box access opening from the outer side of the separation plane and on the other hand an open angular position wherein the outer support plate enables the access to the battery box access opening from the outer side of the separation plane when the battery box is in the outer angular position.

[0016] According to an embodiment of the present invention, the latch bolt lies in the separation plane.

[0017] According to an embodiment of the present invention, the second pivot axis and the third pivot axis lie

at opposing sides of the separation plane. This enables the respectively the inner and outer support plate to rotate between the closed and opened angular positions without being hindered for example by material that would be provided between the second and third pivot axis.

[0018] According to an embodiment of the present invention, the frame comprises a cover box releasably attached to the base plate and side plate of the frame. Preferably, the cover box at least comprises opposing plates perpendicular to the door thickness direction, wherein said opposing plates are provided with openings for receiving the handle shaft. Preferably one of the opposing plates is configured to lay on top of the base plate of the frame. Preferably, the cover box comprises a sidewall perpendicular to the door width direction, preferably arranged to be connected to the side plate of the frame. Preferably, the frame (i.e. comprising the cover box), the inner support plate and the outer support plate together encapsulate the battery box, the locking mechanism and the mechanism for actuating the latch bolt.

[0019] According to an embodiment of the present invention, the first pivot axis extends substantially along the door width direction, and the battery box, preferably the battery box holder, is at least delimited by a sidewall perpendicular to the door width direction. Preferably, said sidewall comprises a first screw hole at a first distance from the first pivot axis, and a second screw hole at a second distance from the first pivot axis, wherein the first and second distances are equal such that upon pivoting the battery box from the inner to the outer angular position, the first and second screw holes lie on the same circular path, and wherein a sidewall of the electrical lock, being one of the sidewall of the cover box or the side plate of the frame, comprises a screw opening for receiving a screw to be inserted in the first or second screw hole of the battery box, wherein said screw opening is provided such that the inserted screw crossed the circular path of the first and second screw holes. Preferably, the screw opening is provided at such a position in the side plate of the frame or the sidewall of the cover box that the battery box is held in the inner angular position by inserting the screw through the screw opening into the first screw hole and that the battery box is held in the outer angular position by inserting the screw through the same screw opening into the second screw hole. Preferably, the screw opening is provided at a position lying substantially in the separation plane, for example positioned between the first pivot shaft and the second pivot shaft. The present embodiments have the advantage of preventing the rotation of the battery box from the inner angular position to the outer angular position for example as an alternative or in addition to the preventive function of the inner and/or outer keypads when they are a closed lid as described above. Preferably, the side plate of the frame is arranged to lie against a pole of the fenced gate such that the side plate of the frame is not accessible by a person when the electric lock is attached to the fenced gate. This has the advantage that the screw in the screw hole cannot be easily removed when the electrical lock is attached to the fenced gate. This makes the theft of the batteries by vandals even more difficult.

[0020] According to an embodiment of the present invention, the locking mechanism comprises:

- a pivot shaft mounted on the frame and extending in a direction of a fourth pivot axis preferably parallel to the door thickness direction,
- a rocker substantially made of magnetically soft material extending between a first end and a second end and provided with a blocking element at its first end, wherein the rocker is pivotally supported by the pivot shaft such as to allow, in the first angular position of the handle shaft follower, a rotation of the rocker around the fourth pivot axis between on the one hand a first position wherein the blocking element blocks the rotation of the handle shaft follower around its axis in the door thickness direction such as to lock the handle shaft follower in its first angular position, and on the other hand a second position wherein the handle shaft follower is unlocked; and an actuating assembly mounted on the frame for moving said rocker between its first and second positions, the actuating assembly comprising an electromagnet powered by the batteries through the powering circuit, the electromagnet being arranged for moving the rocker between its first and second positions by magnetic attraction of at least a portion of the rocker.

[0021] According to an embodiment of the present invention, the frame has mounted thereon a key actuator arranged to be actuated upon rotation of a pin of a key cylinder, and has mounted thereon a sensor assembly arranged to detect the actuation of the key actuator, and has mounted thereon a controller arranged to receive from the sensor assembly a signal indicating that the key actuator is being actuated, wherein the controller is arranged to enable the setting of a new password, which is to be entered in the at least one keypad for unlocking the electrical lock, upon having received the signal from the sensor assembly for a predetermined amount of time. Preferably, the key actuator is actuated by being moved up by the rotation of the key pin in the key cylinder, i.e. by turning the key in the key cylinder. Preferably, the upward movement of the key actuator further actuates a key lever, by rotating the key lever such that the latch bolt moves from the locking to the unlocking position independent of the state of the locking mechanism. Preferably, the sensor assembly comprises a Hall sensor arranged to detect the position of the key actuator, thereby providing a signal to the controller upon sensing the upward position of the key actuator. Preferably, the sensor assembly comprises two Hall sensors such as to perform a differential measurement, thereby alleviating the risk of tempering of the sensors by vandals for example by using an external magnet. In particular, the differential

sensor emits a signal to the controller if one of the two sensors, i.e. the one sensor that is placed adjacent to the position of the key actuator when the key actuator is in the upward position, measures the presence of the key actuator, whilst the other sensor does not sense such presence.

Figures

[0022]

Figure 1 shows a perspective view of an embodiment of the battery powered electrical lock of the present invention, wherein the inner side of the separation plane is mainly shown.

Figure 2 shows the battery powered electrical lock of figure 1 wherein the outer side of the separation plane in mainly shown.

Figure 3 shows the battery powered electrical lock from figure 2 wherein the battery box has been rotated from the inner side of the separation plane to the outer side of the separation plane.

Figure 4 shows the battery powered electrical lock of figure 3 wherein the frame has been completed by a cover box.

Figure 5 shows the battery powered electrical lock of figure 4 wherein the outer keypad has been rotated from the open position to the closes position.

Brief description of the figures

[0023] As shown in figures 1-2, the present invention provides a battery powered electrical lock 1 suitable for attachment to a turning fence gate (not shown). The attachment of the electrical lock 1 to the fence gate is done by providing two attachment bolts 30 which are connectable to a post of the fence gate. The electrical lock 1 comprises a frame comprising a base plate 2 and a side plate 3. The side plate 3 is substantially perpendicular to the base plate 2. The side plate 3 is arranged to lie adjacent to the post of the fence gate on which the electrical lock is attached. The side plate 3 lies perpendicular to the door width direction, i.e. the direction along the width of the fence gate. The base plate 2 lies perpendicular to the door thickness direction, i.e. the direction along the thickness of the fence gate. The base plate 2 comprises a follower opening for receiving a handle shaft follower 4, as well as a keyhole opening 41. The side plate 3 comprises a latch bolt opening 40 for receiving a latch bolt 5. The frame has mounted thereon the following elements:

- A latch bolt 5 extending along the door width direction through the latch bolt opening 40. In practice, the door width direction is the width direction of the fence gate on which the electrical lock 1 is installed. The latch bolt 5 is movably mounted on the frame between a locking and an unlocking position at least by means of a handle (not shown), as is conventional in locks. The post of the fence gate comprises a channel extending in the door width direction, allowing the passage of the latch bolt 5, such that the latch bolt 5 can extend beyond the post of the fence gate and into an opening provided in the fence gate frame. The electrical lock 1 that is depicted in the figures is a reversible lock, i.e. configured to be installed on right and left turning fence gates or on fence gates hinged at the left or right side. The lock is made reversible by providing the latch bolt 5 with a wheel 31 instead of a beveled end.
- A handle shaft follower 4 provided in the follower opening, the handle shaft follower 4 comprising a handle shaft channel 6 extending along an axis in a door thickness direction for receiving a handle shaft (not shown) for said handle. In practice, the door thickness direction is the thickness direction of the fence gate on which the electrical lock is installed. The handle shaft follower 4 is pivotally mounted around its axis in the door thickness direction on the frame between a first and a second angular position, such that in use the handle shaft follower 4 rotates between the first and the second angular position upon of the handle shaft between the first and the second angular position, as is conventional in locks. The channel 6 of the handle shaft follower 4 has a shape in a cross-section with a plane perpendicular to the door thickness direction, which shape substantially corresponds to the shape of the handle shaft taken in a cross-section with a plane perpendicular to the door thickness direction. In particular, the above mentioned shape of the handle shaft follower channel 6 is rectangular. This ensures that the rotation of the handle shaft, for example upon actuation of the handle, results in the rotation of the handle shaft follower 4.
- A mechanism for actuating the latch bolt 5 upon rotation of the handle shaft follower 4 to move the latch bolt 5 from its locking to its unlocking position when the handle shaft follower 4 is rotated from its first angular position to its second angular position and to move the latch bolt 5 from its unlocking to its locking position when the handle shaft follower 4 is rotated from its second angular position to its first angular position. This mechanism comprises a lever (not shown)provided on the handle shaft follower 4 such as to follow the rotation of the handle shaft follower, which lever pulls the latch bolt 5 into the unlocking position upon rotation of the handle shaft follower 4, said pulling action countering the pushing action of a spring 43 which permanently pushed the latch bolt 5 to the locking position.
- A locking mechanism for locking the handle shaft

follower 4, which locking mechanism is arranged to be brought in two states, namely in a locking state wherein the handle shaft follower 4 is locked in its first angular position and in an unlocking state wherein the handle shaft follower 4 is unlocked. The locking mechanism comprises a fourth pivot shaft 37 mounted on the frame and extending in a direction of a fourth pivot axis 54 parallel to the door thickness direction, a rocker 38 substantially made of magnetically soft material extending between a first end and a second end and provided with a blocking element at its first end. The rocker 38 is pivotally supported by the fourth pivot shaft 37 such as to allow, in the first angular position of the handle shaft follower, a rotation of the rocker 38 around the fourth pivot axis between on the one hand a first position wherein the blocking element blocks the rotation of the handle shaft follower 4 around its axis in the door thickness direction such as to lock the handle shaft follower 4 in its first angular position, and on the other hand a second position wherein the handle shaft follower 4 is unlocked. The mechanism further comprises an actuating assembly 39 mounted on the frame for moving said rocker 38 between its first and second positions, the actuating assembly 39 comprising an electromagnet, the electromagnet being arranged for moving the rocker 38 between its first and second positions by magnetic attraction of at least a portion of the rocker 38.

[0024] The structure and function of the electrical lock as described above, i.e. comprising a frame, a handle shaft, a mechanism for actuating the latch bolt and a mechanism for locking the handle shaft follower 4 is known from the patent publication EP1526235. The content of patent publication EP1526235 regarding the above mentioned structure and function of the electrical lock is therefore incorporated herein by reference.

[0025] The electrical lock 1 shown in figures 1 and 2 is different from the lock described in the patent publication EP1526235 at least because the depicted lock is a battery powered electrical lock comprising a battery powered locking mechanism 7, wherein the actuating assembly 39 comprising an electromagnet powered by batteries 9 through a powering circuit 11, the electromagnet being arranged for moving the rocker 38 between its first and second positions by magnetic attraction of at least a portion of the rocker 38.

[0026] The lock depicted in figures 1 and 2 further comprises a key actuator 44 arranged to be moved up and down upon rotation of a pin extending from a key cylinder as in known in the art. The key cylinder (not shown) is arranged to be inserted into the keyhole 41. The key actuator 44 is connected to a key lever 42 rotationally arranged around the axis of the handle shaft follower channel 6 in such a manner as to enable independent rotation of the key lever 42 with respect to the handle shaft follower 4. The upward movement of the key actuator 44 rotates the key lever 42. The rotation of the key lever 42 pulls the latch bolt 5 into its unlocking position against the pushing action of the spring 43. The latch bolt 5 can thus be moved between the locking and unlocking position independently from the rotation of the handle shaft follower 4, and thus irrespective if the handle shaft follower 4 is in an unlocking state or if the handle shaft follower 4 is in a locking state, i.e. thus independently of the activation of the mechanism 7 for locking the handle shaft follower 4. The lock further comprises a sensor assembly arranged to detect the position of the key actuator 44, i.e. arranged to detect if the key actuator has been moved up by the rotation of the key, and for how long it has been moved up. The sensor assembly for example comprises a Hall sensor enabling to detect the presence of a tracer component on the key actuator 44. Preferably, the sensor assembly comprises two Hall sensors such as to enable a differential sensing. The lock further comprises a controller arranged to receive information from the sensor assembly. Upon receiving information from the sensor assembly that the key actuator 44 has been moved up for a predetermined amount of time, i.e. longer than a predetermined threshold, the controller will activate a program enabling the reconfiguration of the code required to be entered in to the keypad for unlocking the lock.

[0027] The lock depicted in figures 1 and 2 comprises a battery box 8 arranged for receiving at least one battery 9 through a battery box access opening 10 and for interconnecting the opposite poles of the at least one battery 9 to a powering circuit 11, which powering circuit 11 interconnects the battery box 8 and the battery powered locking mechanism 7. The lock 1 comprises a first pivot shaft 12 mounted on the frame such as to extend along a first pivot axis 51 lying in a separation plane substantially perpendicular to the door thickness direction. The separation plane is thus defined as the plane perpendicular to the door thickness direction wherein the first pivot axis 51 lies. In the shown embodiment, as well the first pivot shaft 12, as the latch bolt 5 as the attachment bolts 30 lie in the separation plane. The first pivot shaft 12 in particular extends along the door width direction and is anchored on one side in the side plate 3 of the frame. The battery box 8 is pivotally supported by the first pivot shaft 12 such as to enable the pivoting of the battery box 8 between an inner angular position wherein the access opening 10 of the battery box 8 lies on a first side of a separation plane, referred to as the inner side of the separation plane, and an outer angular position wherein the access opening 10 of the battery box 8 lies on the opposite side of the separation plane referred to as the outer side of the separation plane, such that in the inner angular position of the battery box 8, the access opening 10 of the battery box 8 is accessible from the inner side of the separation plane and not accessible from the outer side of the separation plane. In practice, the separation plane lies within and parallel to the fence gate. In practice, the inner side of the separation plane corresponds to the safe

private side of the fence gate, i.e. the side of the fence gate lying within the area enclosed by the fence. In practice, the outer side of the separation plane corresponds to the unsafe public side of the fence gate, i.e. the side of the fence gate lying outside of the area enclosed by the fence e.g. the side that is accessible by the public.

[0028] As shown in the figures 1 and 2, the battery box 8 comprises a container 20 having a bottom wall 15 and upstanding sidewalls 16, 17, 18, 19. The upstanding sidewalls 16, 17, 18, 18 enclose an opening, wherein said opening it the access opening 10 of the battery box 8. The battery box 8 further comprises a battery box holder 14 extending between an upper end and a lower end. The battery box container 20 is provided on the upper end of the battery box holder 14. The battery box holder 14 and the batter box container 20 are integrally formed, i.e. together form a single piece. The upstanding sidewalls 16, 17, 18, 19 of the battery box container 20 are provided with springs (not shown) for clamping the at least one battery 9. The battery box holder 14 is pivotally supported by the first pivot shaft 12 at its lower end.

[0029] As shown in the figures 1 and 2, the battery box holder 14 is at least delimited by a sidewall 13 perpendicular to the door width direction. Said sidewall 13 comprises a first screw hole 22 at a first distance from the first pivot shaft 12, and a second screw hole 23 at a second distance from the first pivot shaft 12, wherein the first and second distances are equal such that upon pivoting the battery box 8 from the inner to the outer angular position, the first and second screw holes 22, 23 lie on the same circular path.

[0030] As shown in the figures 1 and 2 the lock further comprises an outer and an inner keypad respectively supported by an inner and outer support plate 24, 25, wherein inner and outer support plates 24, 25 are attached to the frame in such a manner that the inner support plate 25 is arranged as a lid for the battery box access opening 10 in the inner angular position, and in such a manner that the outer support plate 24 is arranged as a lid for the battery box access opening 10 in the outer angular position. The rotation of the battery box 8 from the inner angular position to the outer angular position is prevented by the inner and/or outer support plates 24, 25 when they are a lid closing the access opening 10 of the battery box 8 as described above. The lock 1 comprises a second pivot shaft 36 coupled to the frame, in particular mounted on the sidewall 29 of the cover box as shown in figures 4 and 5, parallel to the first pivot shaft 12. The second pivot shaft 36 extends along a second pivot axis 52 parallel to the first pivot axis 51. The inner support plate 25 is pivotally supported by the second pivot shaft 36 such as to enable the pivoting of the inner support plate 25 between on the one hand a closed angular position wherein the inner keypad 25 covers the battery box access opening 10 when the battery box 8 is in the inner angular position such as to prevent access to the battery box access opening 10 from the inner side of the separation plane and on the other hand an open angular position wherein the inner support plate 25 enables the access to the battery box access opening 10 from the inner side of the separation plane when the battery box 8 is in the inner angular position. The lock 1 comprises a third pivot shaft 60 coupled to the frame, in particular mounted on the sidewall 29 of the cover box as shown in figures 4 and 5, parallel to the first pivot shaft 12 and the second pivot shaft 36. The third pivot shaft 36 extends along a third pivot axis 53 parallel to the first pivot axis 51 and second pivot axis 52. The outer support plate 24 is pivotally supported by the third pivot shaft 60 such as to enable the pivoting of the outer support plate 24 between on the one hand a closed angular position wherein the outer support plate 24 covers the battery box access opening 10 when the battery box 8 is in the outer angular position such as to prevent access to the battery box access opening 10 from the outer side of the separation plane and on the other hand an open angular position wherein the outer keypad 24 enables the access to the battery box access opening 10 from the outer side of the separation plane when the battery box 8 is in the outer angular position. The first pivot shaft 12 lies between the second pivot shaft 36 and the latch bolt 5 along the door thickness direction.

[0031] Figure 3 shows the battery powered electrical lock 1 from figure 2 wherein the battery box 8 has been rotated from the inner side of the separation plane to the outer side of the separation plane.

[0032] As best shown in figures 4 and 5, the frame comprises a cover box releasably attached to the base plate 2 and side plate 3 of the frame. The cover box is thus part of the frame. The cover box comprises opposing plates 26, 27 perpendicular to the door thickness direction, wherein said opposing plates 26, 27 are provided with openings 28 for receiving the handle shaft and openings 45 for receiving the lock cylinder. One of the opposing plates 27 is configured to lay on top of the base plate 2 of the frame. The cover box further comprises a sidewall 29 perpendicular to the door width direction, arranged to be connected to the side plate 3 of the frame. The cover box, the base plate 2 and side plate 3 of the frame, the inner support plate 24 and the outer support plate 25 together encapsulate the battery box 8, the locking mechanism and the mechanism for actuating the latch bolt. As shown in figures 4 and 5, the sidewall 29 of the cover box comprises a screw opening 31 for receiving a screw to be inserted in the first or second screw hole 22, 23 of the battery box 8, wherein said screw opening 31 is provided such that the inserted screw crossed the circular path of the first and second screw holes 22, 23. The screw opening 31 is provided at such a position in the sidewall 29 of the cover box that the battery box 8 is held in the inner angular position by inserting the screw through the screw opening 31 into the first screw hole 22 and that the battery box 8 is held in the outer angular position by inserting the screw through the same opening 31 into the second screw hole 23. The screw opening 31 is provided at a position lying substantially in the separation plane.

[0033] As best shown in figure 5, the outer keypad 24 comprises pushbuttons 33. The outer keypad comprises an outer electronic processor for detecting the pushing of the pushbuttons 33 of the outer keypad 24, and wherein an outer control circuit interconnects the outer electronic component and the battery powered locking mechanism 7, such as to actuate the battery powered locking mechanism using the power provided by the battery 9. The inner keypad 25 comprises pushbuttons. The inner keypad comprise an inner electronic processor for detecting the pushing of the pushbuttons of the inner keypad 25, and wherein an inner control circuit interconnects the inner electronic component and the battery powered locking mechanism 7, such as to actuate the battery powered locking mechanism 7 using the power provided by the battery 9.

[0034] As best shown in figure 5, the outer keypad 24 comprises an outer cover plate 34 moveably attached to the outer keypad 24 between an open position in which the outer keypad 24 is accessible from the outer side of the separation plane, and a closed position in which the outer keypad 24 is not accessible from the outer side of the separation plane. In figure 5, the outer cover plate 34 is shown in the open position. The inner keypad 25 comprises an inner cover plate 35 moveably attached to inner keypad between an open position in which the inner keypad 25 is accessible from the inner side of the separation plane, and a closed position in which the inner keypad 25 is not accessible from the inner side of the separation plane. In figure 5, the inner cover plate 35 is shown in the closed position.

Claims

1. An electrical lock suitable for attachment to a fence gate, the lock comprising a frame comprising a base plate and a side plate, wherein the base plate comprises a follower opening for receiving a handle shaft follower, and wherein the side plate comprises a latch bolt opening for receiving a latch bolt, the frame having mounted thereon the following elements:

- a latch bolt extending along a door width direction through the latch bolt opening, the latch bolt being movably mounted on the frame between a locking and an unlocking position at least by means of a handle,
- a handle shaft follower provided in the follower opening, the handle shaft follower comprising a handle shaft channel extending along an axis in a door thickness direction for receiving a handle shaft for said handle, the handle shaft follower being pivotally mounted around its axis in the door thickness direction on the frame between a first and a second angular position, such that in use the handle shaft follower rotates between the first and the second angular position upon rotation of the handle shaft between the first and the second angular position,
- a mechanism for actuating the latch bolt upon rotation of the handle shaft follower to move the latch bolt from its locking to its unlocking position when the handle shaft follower is rotated from its first angular position to its second angular position and to move the latch bolt from its unlocking to its locking position when the handle shaft follower is rotated from its second angular position to its first angular position, and
- an electrically powered locking mechanism for locking the handle shaft follower, which locking mechanism is arranged to be brought in two states, namely in a locking state wherein the handle shaft follower is locked in its first angular position and in an unlocking state wherein the handle shaft follower is unlocked,

characterized in that
the electrically powered locking mechanism is a battery powered locking mechanism, and **in that** the frame has mounted thereon a battery box arranged for receiving at least one battery through a battery box access opening and for interconnecting the opposite poles of the at least one battery to a powering circuit, which powering circuit interconnects the battery box and the battery powered locking mechanism,
wherein the battery box is pivotally mounted on the frame around a first pivot axis lying in a separation plane substantially perpendicular to the door thickness direction such as to enable the pivoting of the battery box between an inner angular position wherein the access opening of the battery box lies on a first side of the separation plane referred to as the inner side of the separation plane, and an outer angular position wherein the access opening of the battery box lies on the opposite side of the separation plane referred to as the outer side of the separation plane, such that in the inner angular position of the battery box, the access opening of the battery box is accessible from the inner side of the separation plane and not accessible from the outer side of the separation plane, and wherein the lock comprises an inner and an outer support plate configured for supporting a keypad, wherein the inner and outer support plate are attached to the frame in such a manner that the inner support plate is arranged as a lid for the battery box access opening in the inner angular position, and in such a manner that the outer support plate is arranged as a lid for the battery box access opening in the outer angular position, and wherein at least one of the inner and outer support plates supports a keypad.

2. The electrical lock according to the first claim wherein the inner support plate is pivotally mounted on the

frame around a second pivot axis such as to enable the pivoting of the inner support plate between on the one hand a closed angular position wherein the inner support plate covers the battery box access opening when the battery box is in the inner angular position such as to prevent access to the battery box access opening from the inner side of the separation plane and on the other hand an open angular position wherein the inner support plate enables the access to the battery box access opening from the inner side of the separation plane when the battery box is in the inner angular position, and wherein the outer support plate is pivotally mounted on the frame around a third pivot axis such as to enable the pivoting of the outer support plate between on the one hand a closed angular position wherein the outer support plate covers the battery box access opening when the battery box is in the outer angular position such as to prevent access to the battery box access opening from the outer side of the separation plane and on the other hand an open angular position wherein the outer support plate enables the access to the battery box access opening from the outer side of the separation plane when the battery box is in the outer angular position.

3. The electrical lock according to the preceding claim wherein the second pivot axis and the third pivot axis lie at opposing sides of the separation plane.

4. The electrical lock according to any one of the preceding claims wherein the first pivot axis lies below the battery access opening.

5. The electrical lock according to any one of the preceding claims wherein both the inner and outer support plate support a keypad.

6. The electrical lock according to any one of the preceding claims, wherein the keypad preferably comprises pushbuttons, and wherein the support plate supporting the keypad preferably comprises an electronic processor for detecting the pushing of the pushbuttons of the keypad, and wherein a control circuit interconnects the electronic component and the battery powered locking mechanism.

7. The electrical lock according to any one of the preceding claims wherein the keypad comprises a cover plate moveably attached to the keypad between an open position in which the keypad is accessible from the side of the separation plane on which the keypad is provided, and a closed position in which the keypad is not accessible from the side of the separation plane on which the keypad is provided.

8. The electrical lock according to any one of the preceding claims wherein the frame comprises a cover box releasably attached to the base plate and side plate of the frame, and wherein the frame, the inner support plate and the outer support plate together encapsulate the battery box, the locking mechanism and the mechanism for actuating the latch bolt.

9. The electrical lock according to the preceding claim wherein the cover box at least comprises opposing plates perpendicular to the door thickness direction, wherein said opposing plates are provided with openings for receiving the handle shaft, and wherein the cover box comprises a sidewall perpendicular to the door width direction.

10. The electrical lock according to the preceding claim wherein the first pivot axis extends substantially along the door width direction, and wherein the battery box is at least delimited by a sidewall perpendicular to the door width direction, wherein the sidewall comprises a first screw hole at a first distance from the first pivot axis , and a second screw hole at a second distance from the first pivot axis, wherein the first and second distances are equal such that upon pivoting the battery box from the inner to the outer angular position, the first and second screw holes lie on the same circular path, and wherein the sidewall of the cover box or the side plate of the frame comprises a screw opening for receiving a screw to be inserted in the first or second screw hole of the battery box, wherein said screw opening is provided such that the inserted screw crossed the circular path of the first and second screw holes.

11. The electrical lock according to the preceding claim wherein the screw opening is provided at such a position in the side plate of the frame or the sidewall of the cover box that the battery box is held in the inner angular position by inserting the screw through the screw opening into the first screw hole and that the battery box is held in the outer angular position by inserting the screw through the same screw opening into the second screw hole.

12. The electrical lock according to the preceding claim wherein the screw opening is provided at a position lying substantially in the separation plane.

13. The electrical lock according to any one of the preceding claims wherein the battery box comprises a container comprising a bottom wall and upstanding sidewalls provided with springs for clamping the at least one battery.

14. The electrical lock according to any one of the preceding claims wherein the locking mechanism comprises:

- a pivot shaft mounted on the frame and ex-

tending in a direction of a fourth pivot axis preferably parallel to the door thickness direction,

• a rocker substantially made of magnetically soft material extending between a first end and a second end and provided with a blocking element at its first end, wherein the rocker is pivotally supported by the pivot shaft such as to allow, in the first angular position of the handle shaft follower, a rotation of the rocker around the fourth pivot axis between on the one hand a first position wherein the blocking element blocks the rotation of the handle shaft follower around its axis in the door thickness direction such as to lock the handle shaft follower in its first angular position, and on the other hand a second position wherein the handle shaft follower is unlocked; and

• an actuating assembly mounted on the frame for moving said rocker between its first and second positions, the actuating assembly comprising an electromagnet powered by the batteries through the powering circuit, the electromagnet being arranged for moving the rocker between its first and second positions by magnetic attraction of at least a portion of the rocker.

15. The electrical lock according to any one of the preceding claims wherein the frame has mounted thereon a key actuator (44) arranged to be actuated upon rotation of a pin of a key cylinder, and has mounted thereon a sensor assembly arranged to detect the actuation of the key actuator (44), and has mounted thereon a controller arranged to receive from the sensor assembly a signal indicating that the key actuator is being actuated, wherein the controller is arranged to enable the setting of a new password upon having received the signal from the sensor assembly for a predetermined amount of time.

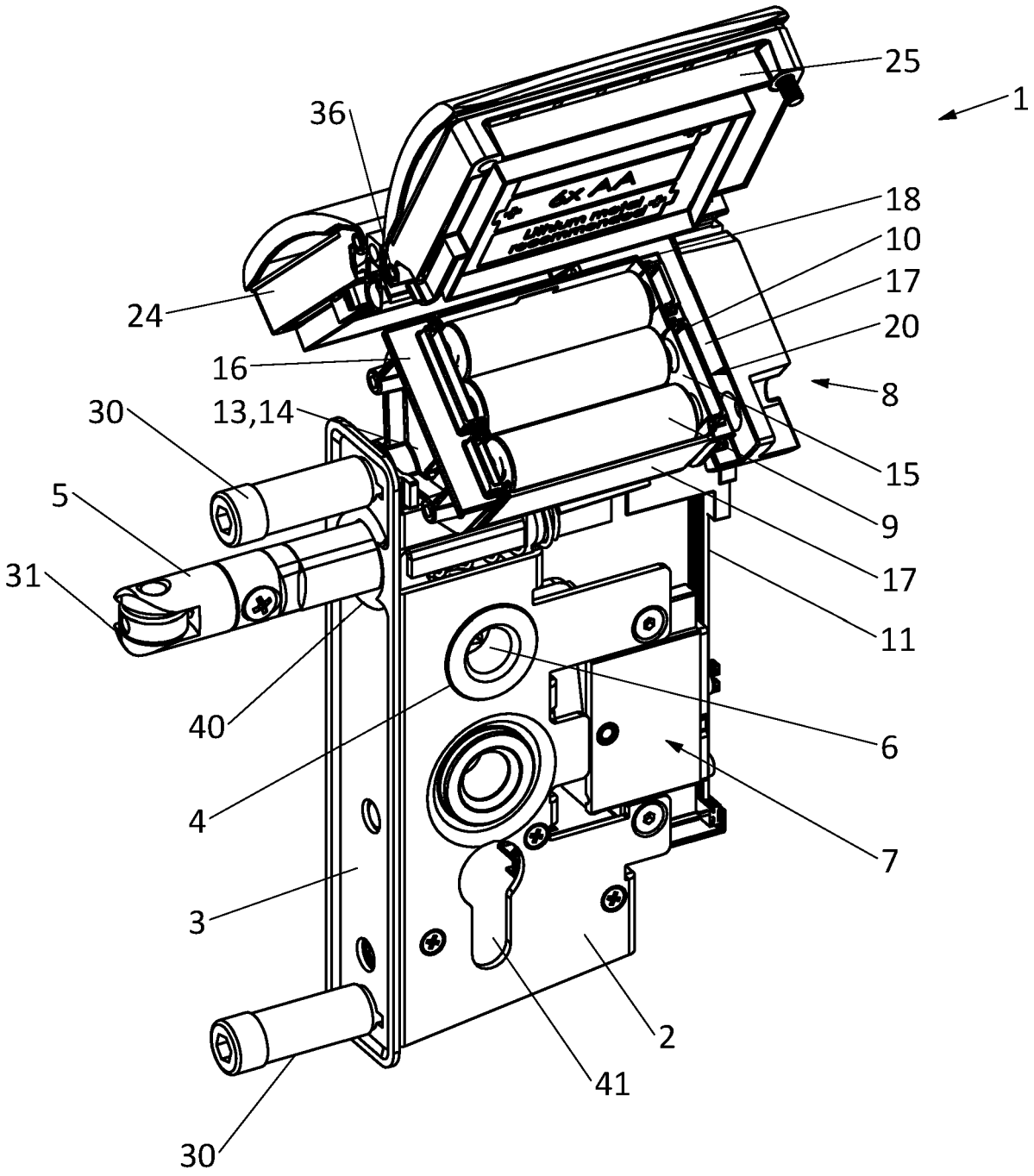

Fig.1

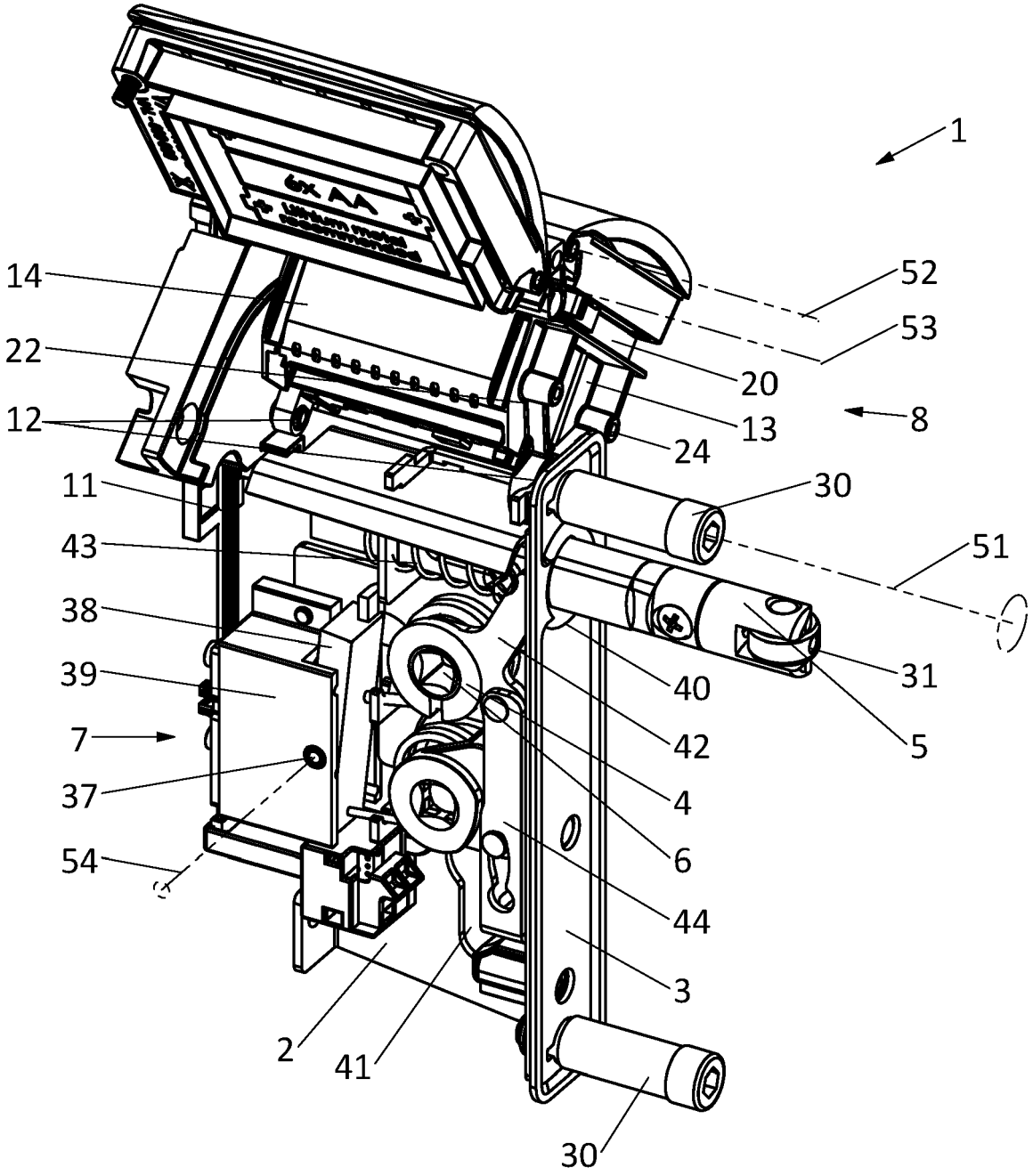
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Fig.2

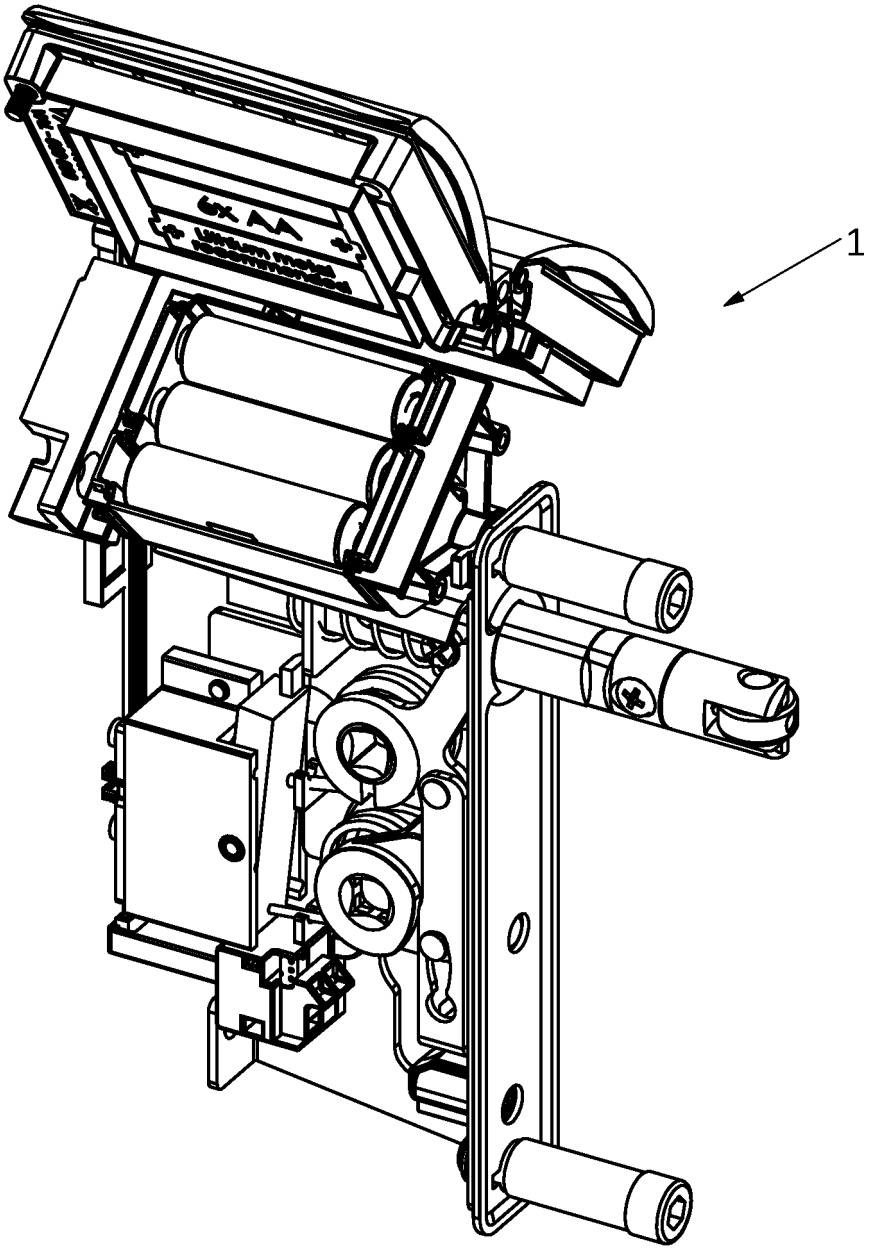

Fig.3

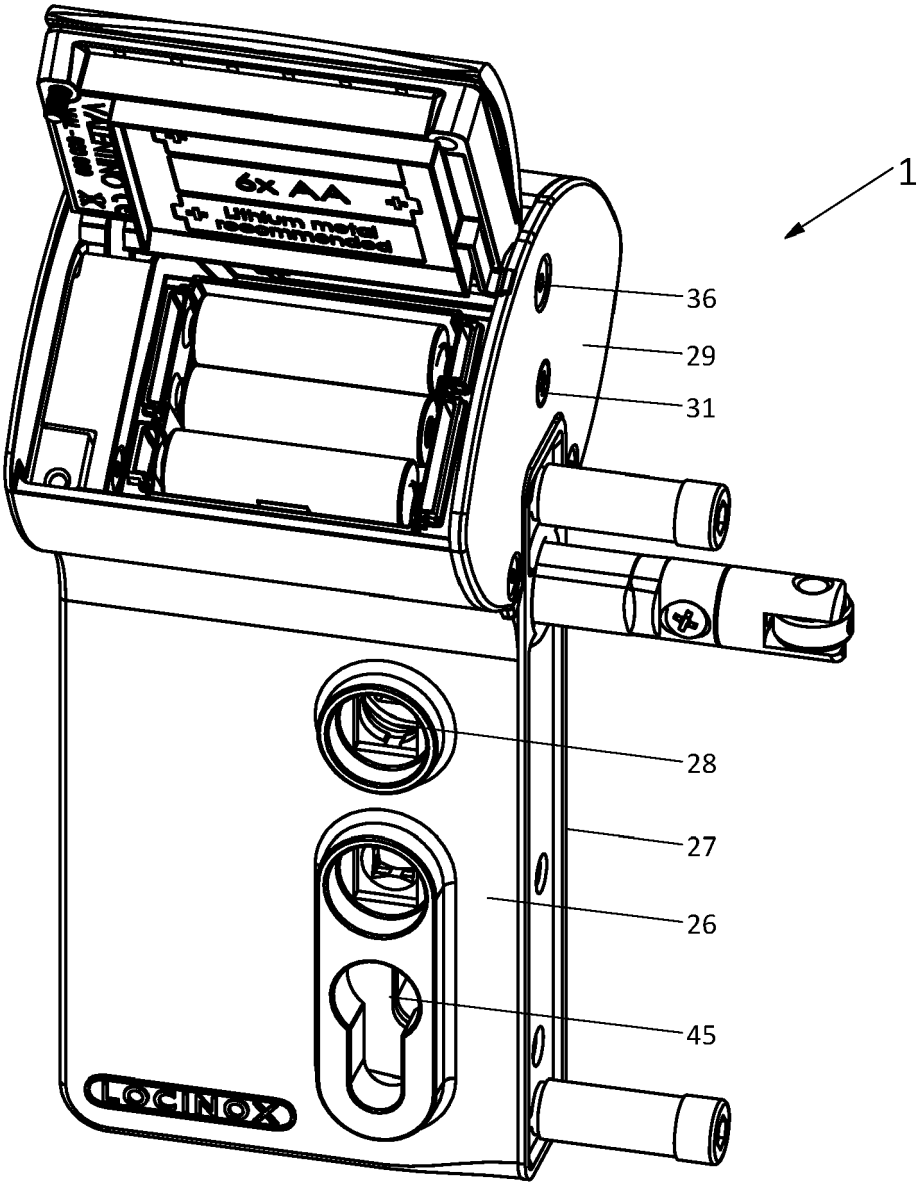

Fig.4

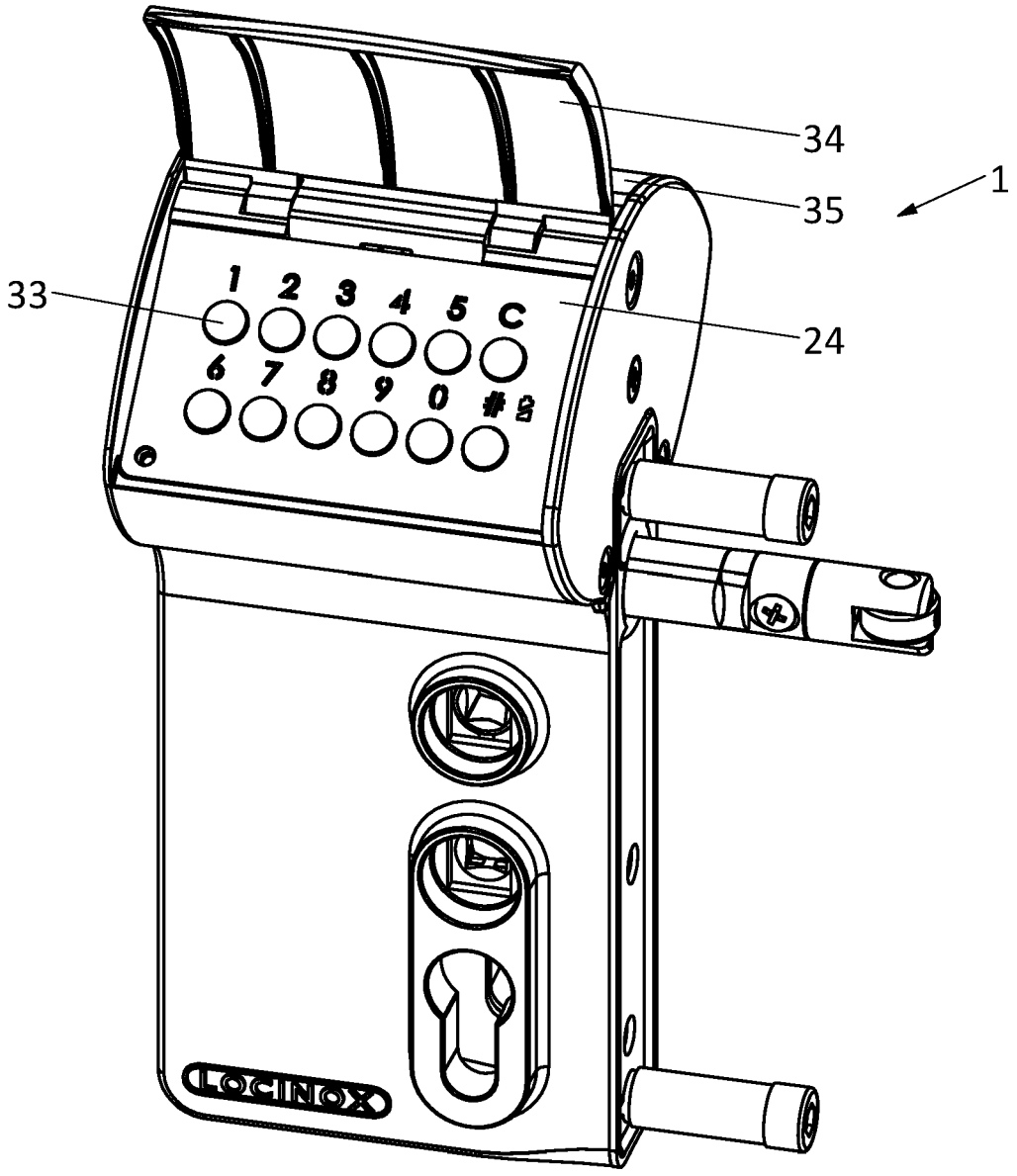

Fig.5

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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 5104

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E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 October 2021	Ansel, Yannick

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