

A GRILL LOCK MECHANISM WITH A PLURALITY OF BIOMETRIC SENSORS

Field of the Invention

5 The present invention relates to a grill lock mechanism with a plurality of biometric sensors, the lock mechanism being typically used in a door grill of an apartment unit, where the door grill and a door are arranged in a parallel configuration and in close proximity with to one another.

Background

Traditionally, locks securing entry/exit grills to apartments have relied on the use of physical keys. In recent times, the grill locks have increasingly moved away from the use of physical keys, and rely on alternatives like, for example, PIN numbers, wireless signals or biometric
15 sensors to actuate the locks.

However, the inward (apartment) facing portion of the grill locks face space constraints as the grill is typically at close proximity to the door. Traditionally, unlocking the grill from the inward facing portion of the grill lock relies on actuating a handle in the form of, for example,
20 a lever or a knob which can fit within the space constraints between the grill and the door. The space constraints are necessary so that third parties are not able to actuate the handle when both the door and grill are closed.

Currently, it is not simple to incorporate additional elements to existing grill locks given the
25 design constraints imposed to enable the locks to be mounted to grills. However, there are issues with current grill locks which need to be resolved.

Summary

30 There is provided a grill lock mechanism including an inner body communicatively coupled to an out body, the grill lock mechanism comprising:

a main controller configured to control all functionality of the grill lock mechanism;
a primary biometric module within the out body, coupled to the main controller, the primary biometric module being configured to capture fingerprint data;

a secondary biometric module positioned at a first portion of the inner body, coupled
5 to the main controller, the secondary biometric module being configured to capture fingerprint data; and

a motor controller within the inner body coupled to the main controller, the motor controller being configured to actuate a motor to control a sub-latch mechanism upon the main controller receiving pre-stored fingerprint data at either the primary biometric module or the
10 secondary biometric module.

It will be appreciated that the broad forms of the invention and their respective features can be used in conjunction, interchangeably and/or independently, and reference to separate broad forms is not intended to be limiting.

Brief Description of the Drawings

A non-limiting example of the present invention will now be described with reference to the accompanying drawings, in which:

FIG 1 is a schematic diagram of an example embodiment of a lock mechanism for grills;

FIG 2 is a photograph of a first view of an example embodiment of the lock mechanism of FIG 1;

FIG 3 is a photograph of a second view of an example embodiment of the lock mechanism of
25 FIG 1;

FIG 4 is a photograph of the second view of an example embodiment of the lock mechanism of FIG 1 with a removed power source cover; and

FIG 5A and 5B are photographs of a dismantled view of an example embodiment of the lock mechanism of FIG 1.

Detailed Description

Embodiments of the present invention provide users with locking mechanism with a plurality of biometric sensors for a grill typically used in apartment units, whereby the grill is positioned in a parallel configuration with a door located at close proximity to the grill. The locking mechanism is configured to function in a manner where an inward facing portion of the locking

5 mechanism is able to operate in a desired manner in a constrained space between the grill and the door when both the grill and the door are in a closed configuration.

A schematic diagram of an example of a lock mechanism 100 for grills will now be described with reference to FIG 1. As shown, the lock mechanism 100 includes the following components which will be listed first, before a more detailed description is provided on their inter-connectivity.

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The lock mechanism 100 comprises two portions, an out body 102, and an inner body 104. In a typical configuration of the lock mechanism 100 when mounted to a grill, the inner body 104 faces a door which is positioned in a parallel configuration to the grill, and the out body 102 faces an opposite direction to the inner body 104. When the lock mechanism 100 is in a locked mode, the grill is unable to be opened. When the lock mechanism 100 is in an unlocked mode, the grill is able to be opened such that the door is accessible.

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20 The out body 102 includes:

- an RFID transceiver 116;
- a keypad 114;
- 25 - an external power circuit 110;
- an illumination driver circuit 108; and
- a primary biometric module 106.

The inner body 104 includes:

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- an I/O connector 118;

- a main controller 142;
- a motor controller 140;
- a motor 138;
- a sub-latch mechanism 136;
- 5 - an audio circuit 134;
- a buzzer 132;
- an external circuit 130;
- a control switch 128;
- a wireless module 126;
- 10 - a secondary biometric module 120;
- a voltage regulator 124; and
- a power source 122.

Referring back to components in the out body 102, the RFID transceiver 116 is used to receive
15 wireless signals from RFID cards/tags to unlock the lock mechanism 100. The keypad 114 is
configured to enable a numerical code to be input, either to unlock the lock mechanism 100 or
to program a usable numerical code. There is also the illumination driver circuit 108 for
controlling illumination elements of the out body 102, and the primary biometric module 106
including a fingerprint sensor for capturing fingerprint data to unlock the lock mechanism 100.
20 Finally, the external power circuit 110 is configured to channel power the various components
of the out body 102.

Referring to the components of the inner body 104, the I/O connector 118 enables components
in the out body 102 to communicate and with components in the inner body 104. The main
25 controller 142 is configured to control functionality of the lock mechanism 100 such that it
operates in a desired manner. The main controller 142 can include a non-volatile memory
module for storage of data such as, for example, fingerprint data, unlocking numerical code,
and so forth. The main controller 142 can also be configured to carry out matching of
fingerprint data, to enable fingerprint data to unlock the lock mechanism 100.

The motor controller 140 is coupled to the motor 138 to control the sub-latch mechanism 136. The sub-latch mechanism 136 can also be actuated using a key. The audio circuit 134 and the buzzer 132 are configured to provide audio output. The external circuit 130 is configured to channel power to the components in inner body 104, the power being drawn from a power source 122 via the voltage regulator 124. The power source 122 can be at least one dry cell battery.

The wireless module 126 is configured to receive wireless signals from mobile devices to unlock the lock mechanism 100. The wireless signals can include, for example, Bluetooth, Z-wave, ZigBee, and so forth. The secondary biometric module 120 is also a fingerprint sensor for capturing fingerprint data to unlock the lock mechanism 100.

Referring to FIG 2, there is shown a first view of an example embodiment of the lock mechanism 100 during use, specifically the out body 102. It should be appreciated that only some components of the out body 102 is visible during use. The keypad 114, and the primary biometric module 106 are visible.

Referring to FIG 3, there is shown a second view of an example embodiment of the lock mechanism 100 during use, specifically the inner body 104. It should be appreciated that only some components of the inner body 104 is visible during use. The sub-latch mechanism 136, the secondary biometric module 120 and a cover 123 of the power source 122 are visible. FIG 4 shows the same view of the lock mechanism 100 of FIG 3, except that the cover 123 is removed. While a key 185 is shown in FIGs 3 and 4, it should be appreciated that the key 185 is removable.

Referring to FIGs 5A and 5B, there are shown dismantled views of an example embodiment of the lock mechanism 100, where FIG 5A shows the inner body 104, and FIG 5B shows the out body 102. FIGs 5A and 5B show how the inner body 104 and the out body 102 are coupled together using a pair of wires 500 so that the lock mechanism 100 is able to operate in a desired manner. For the sake of clarity, it should be appreciated that FIG 5A shows that the pair of wires 500 are not communicatively connected to the I/O connector 118. The pair of wires 500

should be communicatively connected to the I/O connector 118 for the inner body 104 and the out body 102 to be coupled together.

FIG 3 shows the inner body 104 divided broadly to a first portion 160, a second portion 170, and a third portion 180. The secondary biometric module 120 is located at the first portion 160 of the inner body 104. Similarly, the second portion 170 contains the sub-latch mechanism 136 and the third portion 180 houses the power source 122.

FIG 5A also shows the secondary biometric module 120 at the first portion 160 of the inner body 104. The secondary biometric module 120 can be positioned at the first portion 160 with the use of adhesives, the use of mounting structures, or a combination of the aforementioned. The secondary biometric module 120 is located at the first portion 160 of the inner body 104 as that position of the secondary biometric module 120 allows a user to easily access the secondary biometric module 120 when the lock mechanism 100 is mounted to a grill. Referring to FIG 4, it should be appreciated that the location of the secondary biometric module 120 at the first portion 160 ensures that the sub-latch mechanism 136 does not obstruct user access to the secondary biometric module 120. In addition, referring to FIG 5A, locating the secondary biometric module 120 at the first portion 160 also ensures ease of replacement, without affecting components in the second portion 170, and the third portion 180 of the inner body 104. The ease of replacement of the secondary biometric module 120 ensures that acts of vandalism to the lock mechanism 100 does not unduly inconvenience the user. Finally, it should be appreciated that a size of the lock mechanism 100 is constrained by a need to be able to be mounted to apartment grills, and correspondingly, the inclusion of the secondary biometric module 120 to the inner body 104 requires extensive design effort to ensure that the secondary biometric module 120 is able to fit the inner body 104 in a manner which does not jeopardise a durability and reliability of the lock mechanism 100.

It should be noted that the inner body 104 can also be fitted in an upside-down configuration, depending on a desired orientation of the sub-latch mechanism 136.

Generally, the lock mechanism 100 is configured to be unlocked by one of three ways when a user is facing the out body 102, namely,

a. using an RFID card/tag;

5 b. using wireless signals (eg. Bluetooth or Wi-Fi) transmitted from a mobile device like a mobile phone or a tablet; and

c. using a pre-stored fingerprint at the primary biometric module 106.

10 Similarly, the lock mechanism 100 is configured to be unlocked by one of three ways when a user is facing the inner body 104, namely,

i. using a key to actuate the sub-latch mechanism 136;

ii. using wireless signals (eg. Bluetooth or Wi-Fi) transmitted from a mobile device like a mobile phone or a tablet; and

15 iii. using a pre-stored fingerprint at the secondary biometric module 120.

It should be appreciated that pre-stored fingerprints that are able to unlock the lock mechanism 100 at the primary biometric module 106 will also be able to unlock the lock mechanism 100 at the secondary biometric module 120.

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Throughout this specification and claims which follow, unless the context requires otherwise, the word “comprise”, and variations such as “comprises” or “comprising”, will be understood to imply the inclusion of a stated integer or group of integers or steps but not the exclusion of any other integer or group of integers.

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Persons skilled in the art will appreciate that numerous variations and modifications will become apparent. All such variations and modifications which become apparent to persons skilled in the art, should be considered to fall within the spirit and scope that the invention broadly appearing before described.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A grill lock mechanism including an inner body communicatively coupled to an out body, the grill lock mechanism comprising:

5 a main controller configured to control all functionality of the grill lock mechanism;
a primary biometric module within the out body, coupled to the main controller, the primary biometric module being configured to capture fingerprint data;

a secondary biometric module positioned at a first portion of the inner body, coupled to the main controller, the secondary biometric module being configured to capture fingerprint
10 data; and

a motor controller within the inner body coupled to the main controller, the motor controller being configured to actuate a motor to control a sub-latch mechanism upon the main controller receiving pre-stored fingerprint data at either the primary biometric module or the secondary biometric module.

15 2. The grill lock mechanism of claim 1, further comprising:

a sub-latch mechanism positioned at a second portion of the inner body; and
a power source at a third portion of the inner body.

20 3. The grill lock mechanism of claim 2, wherein the sub-latch mechanism is able to be actuated by a key.

4. The grill lock mechanism of any of claims 1 to 3, wherein the primary biometric module and the secondary biometric module respectively include a fingerprint sensor.

25 5. The grill lock mechanism of any of claims 1 to 4, wherein the main controller is configured to store fingerprint data to actuate the motor.

30 6. The grill lock mechanism of any of claims 1 to 5, wherein the main controller is configured to carry out matching of fingerprint data.

7. The grill lock mechanism of any of claims 1 to 6, wherein the secondary biometric module is replaceable.

8. The grill mechanism of any of claims 1 to 7, wherein the secondary biometric module
5 is positioned to the first portion using adhesives.

9. The grill mechanism of any of claims 1 to 7, wherein the secondary biometric module
is positioned to the first portion using mounting structures.