WIRELESS CHARGING DOOR LOCK DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

The present application claims priority and the benefit of Korean Patent Application No.10-2024-0150688, filed on October 30, 2024 in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference.

BACKGROUND

1. Field of the Invention

The present invention relates to a wireless charging door lock device, and more specifically, to a wireless charging door lock device in which one surface of a charging unit fastened to and installed on an outer surface of an inner door lock in a one-touch manner is formed to extend adjacent to a power output unit so that, when an entrance door is closed, the charging unit receives electric power from the power output unit in a wireless manner to charge a secondary battery of the inner door lock in real time.

2. Discussion of Related Art

Typically, a door lock is installed on an entrance door and controls the entrance door to be accessed using an ID card, a fingerprint, a password, etc.

In this case, a door lock capable of selectively using an ID card, a fingerprint, or a password can be driven by receiving electric power from a disposable battery while the disposable battery is embedded in the door lock.

However, since recent door locks require a significant amount of electric power due to the implementation of a radio frequency ID (RFID), near field communication (NFC), an ID card, fingerprint and iris recognition, and an IoT function, batteries installed in the door lock need to be frequently replaced.

Patent Document 1 discloses the conventional door lock power supply device, and referring to this document, the device includes an outdoor body which is installed on an outdoor surface of an entrance door and receives an operation signal from a user, an indoor body which is installed on an indoor surface of the entrance door to correspond to the outdoor body and responds to the signal input to the outdoor body to restrict access to the entrance door or open the entrance door, a wireless power receiver installed on an upper end of the indoor surface of the entrance door and connected to the indoor body, and a wireless power transmitter which is fixedly installed on an inner upper surface of a door frame to correspond to the wireless power receiver and outputs wireless electric power to the wireless power receiver.

Here, when the entrance door is closed and the indoor body restricts access to the entrance door, the wireless power receiver is vertically and collinearly positioned with the wireless power transmitter and, at this time, receives electric power output from the wireless power transmitter and transmits the received electric power to the indoor body through a flat wire.

Then, a battery-type contact, which is installed in a battery accommodation space of the indoor body and connected to the wireless power receiver through the flat wire, receives electric power and maintains a charged state.

In this case, the battery-type contact supplies electric power to the indoor body while installed in the battery accommodation space.

However, in the case of that in Patent Document 1, since the indoor body is connected to the wireless power receiver through the flat wire and the flat wire is directly exposed at the outside of the entrance door, the externally exposed flat wire can be disconnected or damaged by external factors, resulting in the loss of the wireless charging function through the wireless power receiver, since the wire is directly connected to the battery-type contact fastened to the battery accommodation space, the wire can be pressed and damaged by a cover covering the indoor body, and since a complicated and unstable connection structure is adapted, installation becomes difficult and the likelihood of functional failure of products increases, resulting in reduced product reliability.

[Related Art Documents]

(Patent Document)

(Patent Document 0001) KR 20-2019-0001526 U

SUMMARY OF THE INVENTION

The present invention is directed to providing a wireless charging door lock device which includes an inner door lock installed on an entrance door, a power output unit installed on an inner wall of a door frame on which the entrance door is installed, and a charging unit which is attached and fastened to an outer surface of the inner door lock in a one-touch manner and connected to a secondary battery and whose one side surface is formed adjacent to the power output unit, in which the charging unit is attached and fastened to the inner door in the one-touch manner so that the charging unit is connected to the secondary battery of the inner door lock, and in this state, when the entrance door is opened or closed, the charging unit is prevented from interfering with the power output unit, and when the entrance door is

closed, the charging unit has the one side surface collinearly positioned with the power output unit and receives electric power from the power output unit in a wireless manner to charge the secondary battery of the inner door lock in real time.

According to the present invention, there is provided a wireless charging door lock device including an inner door lock which accommodates a rechargeable secondary battery therein and is installed on an entrance door to lock and unlock the entrance door, a power output unit which allows the entrance door to be installed, is installed to be exposed at an inner wall of a door frame to face the inner door lock rotated by the entrance door, and outputs electric power in a wireless manner, and a charging unit which is detachably installed on an outer surface of the inner door lock in a one-touch manner, is electrically connected to the secondary battery, is formed so that one side surface thereof is positioned adjacent to the power output unit, and receives the electric power in a wireless manner from the power output unit to charge the secondary battery.

The power output unit may be provided as a pair of power output units that are symmetrically installed on upper and lower ends of the inner wall of the door frame, and the charging unit may be provided as a pair of charging units that are symmetrically installed on upper and lower ends of the outer surface of the inner door lock to correspond to the power output units and simultaneously receives the electric power from the power output units to charge the secondary battery.

The charging unit may include a cover fastened to surround the outer surface of the inner door lock, and a wireless reception member which is formed on one side surface of the cover, is positioned adjacent to the power output unit, and receives the electric power output from the power output unit in a wireless manner.

The power output unit may be formed to have a predetermined length in a longitudinal direction of the inner wall of the door frame on which the entrance door is installed, formed to have a length proportional to a width of the inner wall of the door frame, or formed to have a length relatively larger than the width of the inner wall of the door frame, and the wireless reception member may have a plate shape, may be formed proportional to an area of the power output unit, and may receive the electric power from the power output unit in a wireless manner.

A contact terminal may be formed on the outer surface of the inner door lock, wherein the contact terminal may be electrically connected to the secondary battery mounted therein, and a ground terminal which may further be formed on an inner surface of the charging unit facing the outer surface of the inner door lock to correspond to the contact terminal, may be electrically connected to the wireless reception member, and may be in contact with the contact terminal to apply electric power to the contact terminal.

A mounting magnet may be formed on the outer surface of the inner door lock facing the cover, and an attachment magnet may further be formed on an inner surface of the cover facing the inner door lock to correspond to the mounting magnet and may be attached to the mounting magnet to maintain a state in which the cover is attached to the inner door lock.

Fastening grooves may be formed in one side surface of the cover, and a plurality of catch protrusions may be formed on facing inner walls of the fastening groove in a longitudinal direction, and in the wireless reception member, a length adjustment block may be formed to be engaged with the fastening groove and has catch grooves formed in both side surfaces thereof, wherein the catch grooves may be caught on the catch protrusions in multiple steps to adjust an exposure distance,

and a wireless reception plate may further formed on an end of the length adjustment block to be positioned adjacent to the power output unit to be proportional to the exposure distance of the length adjustment block to receive the electric power from the power output unit in a wireless manner.

BRIEF DESCRIPTION OF THE DRAWINGS

The following drawings attached to the present specification illustrate various exemplary embodiments of the present invention and further describe aspects and features of the present invention together with the detailed description of the present invention. Thus, the present invention should not be construed as being limited to the drawings, in which:

FIG. 1 is a perspective view illustrating a wireless charging door lock device according to the present invention;

FIG. 2 is an exploded perspective view of FIG. 1;

FIG. 3 is a perspective view illustrating a charging unit of the wireless charging door lock device according to the present invention;

FIG. 4 is a plan view illustrating a state in which the charging unit of the wireless charging door lock device according to the present invention receives electric power;

FIG. 5 is a plan view illustrating a state in which the supply of electric power to the charging unit of the wireless charging door lock device according to the present invention is cut off;

FIG. 6 is a plan view of the wireless charging door lock device according to the present invention; and

FIG. 7 is a plan view illustrating a state in which a length of a wireless reception member of the wireless charging door lock device according to the present invention is adjusted.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Hereinafter, various embodiments of the present invention will be described in more detail with reference to the accompanying drawings.

Referring to FIGS. 1 to 7, an inner door lock 100 may accommodate a secondary battery 101 therein and may be installed on an entrance door 11 to lock and unlock the entrance door 11.

The inner door lock 100 may be installed on an indoor surface of the entrance door 11 to lock and unlock the entrance door 11.

The inner door lock 100 may be connected to an outer door lock (not illustrated) installed on an outer surface of the entrance door 11 and may receive a signal from the outer door lock (not illustrated) to lock and unlock the entrance door 11.

The inner door lock 100 allows the charging unit 300 to be attached and installed thereon so that a wireless reception member 302 of the charging unit 300 is positioned adjacent to the power output unit 200.

The inner door lock 100 is moved away from the power output unit 200 by the entrance door 11 being opened, and thus the charging unit 300 is unfastened and separated from the power output unit 200.

The inner door lock 100 is positioned adjacent to the power output unit 200 by the entrance door 11 being closed so that the charging unit 300 receives electric power from the power output unit 200 in a wireless manner.

A contact terminal 100a is formed on an outer surface of the inner door lock 100 and is electrically connected to the secondary battery 101 mounted inside the inner door lock 100.

The contact terminal 100a allows a ground terminal 300a of the charging unit 300 to come into contact therewith and receives electric power through the ground terminal 300a to charge the secondary battery 101.

The contact terminal 100a is preferably formed to correspond to the shape of the ground terminal 300a.

A mounting magnet 100b is formed on the outer surface of the inner door lock 100 facing a cover 301.

The mounting magnet 100b allows an attachment magnet 301a of the cover 301 to be magnetically attached and forcibly maintains a state in which the cover 301 is attached and fastened to the outer surface of the inner door lock 100.

The power output unit 200 is installed on an inner wall of a door frame 10 on which the entrance door 11 is installed and outputs electric power in a wireless manner.

The power output unit 200 may be attached and installed on the inner wall of the door frame 10 or embedded and installed in the inner wall of the door frame 10.

The power output unit 200 receives electric power from the outside, outputs the electric power in a wireless manner, and transmits the electric power to the charging unit 300.

The power output unit 200 outputs electric power to the charging unit 300 in a wireless manner when the charging unit 300 is positioned to face the power output unit 200 by the inner door lock 100 and cuts off the electric power when the charging unit 300 is moved away from the power output unit 200 by the inner door lock 100.

A pair of power output units 200 are symmetrically installed on upper and lower ends of the inner wall of the door frame 10.

The power output units 200 simultaneously output electric power to a pair of charging units 300 symmetrically installed above and below the inner door lock 100 in a wireless manner.

The power output unit 200 is formed to have a predetermined length in a longitudinal direction of the inner wall of the door frame 10 on which the entrance door 11 is installed, formed to have a length proportional to a width of the inner wall of the door frame 10, or formed to have a length relatively greater than the width of the inner wall of the door frame 10.

The power output unit 200 changes the amount of electric power output to the charging unit 300 in proportion to the width or length thereof.

The charging unit 300 is installed to be detachably attached to the outer surface of the inner door lock 100 in a one-touch manner, is electrically connected to the secondary battery 101, has one side surface formed adjacent to the power output unit 200, and receives electric power from the power output unit 200 in a wireless manner to charge the secondary battery 101.

The charging unit 300 is installed on the inner door lock 100 and also fixedly positioned to face the power output unit 200 to receive electric power from the power output unit 200.

The charging unit 300 is moved away from the power output unit 200 by the inner door lock 100 being opened, and thus the supply of the wireless power from the power output unit 200 is cut off.

The supply of wireless power is cut off when the charging unit 300 is moved a predetermined distance or more from the power output unit 200.

A pair of charging units 300 are symmetrically installed on the upper and lower ends of the outer surface of the inner door lock 100 to correspond to the power output unit 200 and simultaneously receive electric power from the power output units 200 to charge the secondary battery 101.

The charging unit 300 may be installed alone or the pair of charging units 300 may be symmetrically installed on the outer surface of the inner door lock 100 to receive electric power from the power output unit 200.

The charging unit 300 includes the cover 301 fastened to surround the outer surface of the inner door lock 100 and the wireless reception member 302 which is formed on one side surface of the cover 301, positioned adjacent to the power output unit 200, and receives the electric power output from the power output unit 200.

The cover 301 is fixedly fastened to the outer surface of the inner door lock 100 to maintain a state in which the wireless reception member 302 faces the power output unit 200.

Preferably, the cover 301 is formed of a transparent or translucent material and fixedly fastened to the outer surface of the inner door lock 100.

The position of the cover 301 may be adjusted by moving the cover 301 up and down while the cover 301 is fastened to the outer surface of the inner door lock 100.

The attachment magnet 301a is further formed on an inner surface of the cover 301 facing the inner door lock 100 to correspond to the mounting magnet 100b and attached to the mounting magnet 100b to maintain a state in which the cover 301 is attached to the inner door lock 100.

Since the attachment magnet 301a is attached to the mounting magnet 100b by magnetic force, the cover 301 is prevented from being separated and moving away from the outer surface of the inner door lock 100.

A fastening groove 301b is formed in one side surface of the cover 301, and a plurality of catch protrusions 301b-1 are formed on facing inner walls of the fastening groove 301b in a longitudinal direction.

The catch protrusions 301b-1 allow catch grooves 302a-1 of a length adjustment block 302a to be caught in multiple steps, thereby adjusting an exposure distance of the length adjustment block 302a.

A state in which the wireless reception member 302 faces the power output unit 200 by the cover 301 is maintained.

The wireless reception member 302 has a plate shape, is formed proportional to an area of the power output unit 200, and receives electric power from the power output unit 200 in a wireless manner.

The wireless reception member 302 is formed larger or smaller according to the area of the power output unit 200, and the amount of electric power applied from the power output unit 200 varies depending on the size of the area.

An installation height of the wireless reception member 302 is determined by the cover 301 attached and fastened to the inner door lock 100.

In the wireless reception member 302, the length adjustment block 302a is formed to be engaged with the fastening groove 301b and has catch grooves 302a-1 formed in both side surfaces thereof to adjust the exposure distance, the catch grooves 302a-1 are caught on the catch protrusions 301b-1 in multiple steps, and a wireless reception plate 302b is further formed on an end of the length adjustment block 302a to be proportional to the exposure distance of the length adjustment block

302a and positioned adjacent to the power output unit 200 to receive electric power from the power output unit 200 in a wireless manner.

The length adjustment block 302a enters the fastening groove 301b so that the wireless reception plate 302b moves away from the power output unit 200 or is exposed to the outside of the fastening groove 301b so that the wireless reception plate 302b is positioned adjacent to the power output unit 200.

The length adjustment block 302a is fixed at a predetermined distance outside the fastening groove 301b by engaging the catch groove 302a-1 with the fastening protrusion 301b-1 in multiple steps, thereby fixing the wireless reception plate 302b at a position spaced a predetermined distance from the power output unit 200.

Preferably, the catch groove 302a-1 may be recessed in a semicircular shape and caught on the catch protrusion 301b-1 in multiple steps.

The wireless reception plate 302b is formed proportional to the size of the area of the power output unit 200 and receives electric power from the power output unit 200.

The wireless charging door lock device according to the present invention provided as described above is used as follows.

The wireless charging door lock device according to the present invention may be connected to an external power source by attaching and installing the power output unit 200 onto the inner wall of the door frame 10 or embedding and installing the power output unit 200 in the inner wall of the door frame 10, but hereinafter, an example in which the power output unit 200 is attached and installed on the inner wall of the door frame 10 will be described.

First, the charging unit 300 is detachably attached and fixedly fastened to the outer surface of the inner door lock 100 in a one-touch manner, and the power output unit 200 is attached and installed on the inner wall of the door frame 10 on which the entrance door 11 is installed to correspond to a height of the charging unit 300.

Then, the charging unit 300 and the power output unit 200 are positioned at the same height.

Here, the charging unit 300 includes the cover 301 and the wireless reception member 302, and in a state in which the cover 301 is positioned adjacent to the outer surface of the inner door lock 100, when the attachment magnet 301a of the cover 301 is positioned on the mounting magnet 100b of the inner door lock 100, the attachment magnet 301a is attached to the mounting magnet 100b by the magnetic force, and a state in which the cover 301 is attached to the outer surface of the inner door lock 100 in a one-touch manner is maintained.

In this case, a state in which the cover 301 is attached to the outer surface of the inner door lock 100 is maintained, also the ground terminal 300a of the charging unit 300 is in contact with the contact terminal 100a of the inner door lock 100, and thus a state in which the charging unit 300 and the secondary battery 101 of the inner door lock 100 are electrically connected is maintained.

Then, when the entrance door 11 is locked by the inner door lock 100 to block the accessible door frame 10 in a state in which the entrance door 11 is rotated, the wireless reception member 302 of the charging unit 300 installed on the entrance door 11 is positioned on the same height as the power output unit 200, and also a state in which the wireless reception member 302 is spaced a predetermined distance from the power output unit 200 is maintained.

Then, the power output unit 200 outputs electric power toward the wireless reception member 302 in a wireless manner, and then the wireless reception plate 302b of the wireless reception member 302 receives electric power in a wireless manner.

In addition, since the electric power applied to the wireless reception plate 302b is transmitted to the contact terminal 100a through the ground terminal 300a, the secondary battery 101 connected to the contact terminal 100a is charged by receiving electric power from the contact terminal 100a.

When a separation distance between the wireless reception plate 302b of the wireless reception member 302 and the power output unit 200 is a predetermined distance or more and thus wireless power application between the wireless reception plate 302b and the power output unit 200 is not smooth, the length adjustment block 302a of the wireless reception member 302 moves a predetermined distance or more to be exposed to the outside of the fastening groove 301b of the cover 301 so that the wireless reception plate 302b is positioned adjacent to the power output unit 200.

That is, as the length adjustment block 302a moves within the fastening groove 301b in a sliding manner, the catch groove 302a-1 of the length adjustment block 302a is caught on the catch protrusion 301b-1 within the fastening groove 301b in multiple steps to limit the exposure distance of the length adjustment block 302a, thereby controlling the exposure distance of the length adjustment block 302a exposed to the outside of the fastening groove 301b.

In this case, the exposure distance of the length adjustment block 302a may be adjusted by the user after checking whether wireless power is applied between the wireless reception plate 302b and the power output unit 200 or the intensity of the wireless power.

In addition, in a state in which the entrance door 11 is locked as described above, the secondary battery 101 of the inner door lock 100 is continuously charged by receiving electric power through the wireless reception member 302 of the charging unit 300 in a wireless manner.

On the other hand, in the case of entry or exit through the door frame 10, the inner door lock 100 is unlocked, and the entrance door 11 is rotated to open in a state in which the inner door lock 100 is unlocked, thereby allowing the entry or exit through the door frame 10.

In this case, the charging unit 300 installed on the inner door lock 100 moves away from the power output unit 200, thereby blocking the wireless reception member 302 from receiving electric power from the power output unit 200 in a wireless manner and blocking the wireless charging of the inner door lock 100.

Here, the wireless reception member 302 receives electric power in a wireless manner in a state in which the wireless reception member 302 is spaced a predetermined distance from the power output unit 200, thereby preventing collision interference with the door frame 10 or the power output unit 200 during the rotation of the entrance door 11.

Thereafter, in the same manner, in the case of entry or exit through the door frame 10, while opening or closing of the entrance door 11 is performed, the secondary battery 101 of the inner door lock 100 is continuously charged in real time in a wireless manner, thereby allowing the inner door lock 100 to be used semi-permanently.

As described above, according to the structure in which the charging unit 300 is fastened to and installed on the inner door lock 100 in a one-touch manner and the charging unit 300 receives electric power from the power output unit 200 in a

wireless manner to charge the secondary battery 101 of the inner door lock 100 in real time when the entrance door 11 is closed, the charging unit 300 can be easily attached and fastened to the inner door lock 100 in a one-touch manner, and since the charging unit 300 can be detachably attached in a one-touch manner, anyone can easily install the charging unit 300 on the inner door lock 100. In addition, since the charging unit 300 can be detachably attached to the inner door lock 100, the maintenance of the inner door lock 100 or the charging unit 300 can be easily performed. Since the charging unit 300 and the secondary battery 101 can be attached and fastened in a one-touch manner and also the charging unit 300 and the secondary battery 101 can be connected, a separate operation of connecting the secondary battery 101 and the charging unit 300 is unnecessary.

According to the present invention, a charging unit can be easily attached and fastened to an inner door lock in a one-touch manner. Since the charging unit can be detachably attached in the one-touch manner, anyone can easily install the charging unit on the inner door lock. I In addition, since the charging unit can be detachably attached to the inner door lock, maintenance of the inner door lock or the charging unit can be easily performed Since the charging unit can be attached and fastened to the inner door lock in the one-touch manner and also the charging unit and a secondary battery can be connected, a separate operation of connecting the secondary battery to the charging unit is unnecessary, and in particular, when an entrance door is closed, the power output unit can supply electric power to the charging unit in a wireless manner to charge the secondary battery in real time through the charging unit. I In addition, when the entrance door is opened or closed, a state in which the charging unit is spaced a predetermined distance from the power

output unit can be maintained, thereby eliminating a concern that the charging unit will interfere with the power output unit and improving the reliability of a product.

The wireless charging door lock device according to the present invention is not limited to various embodiments described above, and those skilled in the art to which the present invention pertains may implement various changes and modifications within the scope of the appended claims without departing from the spirit of the present invention.