

DESCRIPTION

TITLE

ELECTRIC LOCK DEVICE, HOME DELIVERY BOX, AND
HOME DELIVERY BOX SYSTEM

TECHNICAL FIELD

[0001]

The present disclosure relates to an electric lock device installed in a home delivery
box, a home delivery box having such an electric lock device, and a home delivery box
system.

BACKGROUND

[0002]

In the conventional art, Patent Literature 1 discloses a smart mailbox comprising: a
housing having a door with a lock; a box-opening code input device for inputting a box-
opening code for unlocking and opening the box; and a communication module that
communicates with a remote management terminal. It is disclosed that this smart
mailbox comprises: a storage module for storing one or more preset box-opening codes;
and a processing module that determines whether or not an input box-opening code
matches a preset box-opening code, and that can provide a box-opening command when a
match is determined.

CITATION LIST

PATENT LITERATURE

[0003]

Patent Literature 1: JP 2016-538446 A

SUMMARY

TECHNICAL PROBLEM

[0004]

5 According to the smart mailbox described in the above Patent Literature 1, input of the box-opening code is carried out using a keyboard that constitutes the box-opening code input device. For this reason, the input involves a time-consuming process, and is also problematic in that input errors tend to occur.

[0005]

10 The present disclosure is directed to providing an electric lock device for use in a home delivery box, which enables easy and reliable operation for unlocking the door of the home delivery box. The present disclosure is further directed to providing a home delivery box having such an electric lock device, and a home delivery box system.

15 SOLUTION TO PROBLEM

[0006]

 An electric lock device according to the present disclosure is an electric lock device installed in a door of a home delivery box, including: a power supply section provided independently for each home delivery box; an electric lock section that unlocks the door
20 using electric power supplied from the power supply section; a communication section that communicates with a portable terminal carried by a user of the home delivery box; a storage section that stores a condition for unlocking; and a control section that compares information received by the communication section from the portable terminal with the condition for unlocking stored in the storage section. The control section issues an
25 unlock command to the electric lock section when the information received from the portable terminal matches the condition for unlocking.

[0007]

A home delivery box according to the present disclosure incorporates the above-described electric lock device, and a home delivery box system according to the present disclosure is configured by arranging, in at least one of a vertical direction and a horizontal direction, home delivery boxes each incorporating the above-described electric lock
5 device.

ADVANTAGEOUS EFFECTS OF INVENTION

[0008]

According to an electric lock device, home delivery box having such an electric lock
10 device, and home delivery box system pertaining to the present disclosure, an operation for unlocking a door of a home delivery box can be carried out easily and reliably.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

15 FIG. 1 is a schematic configuration diagram of a home delivery box system including a plurality of home delivery boxes each having an electric lock device according to one embodiment.

FIG. 2 is a functional block diagram of the electric lock device.

FIG. 3A is a perspective view showing an embodiment in which a plurality of home
20 delivery boxes are assembled using a rail structure.

FIG. 3B is a front view, which partially includes broken away parts, showing an embodiment in which a plurality of home delivery boxes are placed in a fixed state using bolts and nuts.

FIG. 3C is a perspective view showing an embodiment in which a plurality of home
25 delivery boxes are secured to a pole structure.

FIG. 3D is a perspective view showing an embodiment in which a plurality of home delivery boxes are mounted on a wall surface.

In FIG. 4, (a)~(f) are diagrams illustrating a procedure performed at the time of parcel deposit, and (g)~(l) are diagrams depicting a procedure performed at the time of parcel retrieval.

5 DESCRIPTION OF EMBODIMENTS

[0010]

Embodiments according to the present disclosure are described below in detail with reference to the attached drawings. In the following description, specific shapes, materials, numerical values, directions, and the like are given as examples for facilitating
10 understanding of the present disclosure, and may be changed as appropriate in accordance with applications, purposes, specifications, etc. Further, when the following refers to a plurality of embodiments or variants, it is envisioned from the beginning that characteristic features thereof may be used in combination as appropriate.

[0011]

15 FIG. 1 is a schematic configuration diagram of a home delivery box system 100 including a plurality of home delivery boxes 10 each having an electric lock device 20 according to one embodiment of the present disclosure. The home delivery box system 100 is installed in, for example, an entrance lobby of an apartment building, a station, a convenience store, or the like.

20 [0012]

The home delivery box system 100 is configured by assembling, into one unit, a plurality of home delivery boxes 10 arranged in a matrix. The present embodiment shows an example in which six home delivery boxes 10 are arranged in two rows by three columns. The home delivery box system 100 comprises a mounting base 12, and the
25 respective home delivery boxes 10 are installed on the mounting base 12.

[0013]

Each home delivery box 10 has a door 14 on the front side. The door 14 is

configured such that its one end portion located in the width direction, which is a direction along the horizontal direction, is coupled by a hinge, and is thereby configured to be capable of opening and closing the space within the box. On an inner face of the door 14, the electric lock device 20 is installed. In the present embodiment, a separate electric lock device 20 is provided for each home delivery box 10. The electric lock device 20 has the function to lock or unlock the door 14. When the electric lock device 20 is locked, the door 14 is locked in a closed state, and when the electric lock device 20 is unlocked, the door 14 is capable of being opened.

[0014]

The electric lock device 20 performs short-range wireless communication with a portable terminal 50 carried by a user of the home delivery box 10, and thereby carries out unlock and lock operations. For example, Bluetooth (registered trademark) may be used favorably for the communication between the portable terminal 50 and the electric lock device 20. However, the scheme of communication between the portable terminal 50 and the electric lock device 20 is not limited thereto, and other communication schemes such as infrared wireless communication may alternatively be used. As the portable terminal 50, a smartphone, for example, may be used favorably. However, the portable terminal 50 is not limited thereto, and may alternatively comprise a tablet or the like capable of performing communication.

[0015]

Further, the user's portable terminal 50 performs wireless communication with a server 200 of a management company or the like that manages and operates the home delivery box system 100. In the home delivery box system 100, by having the user perform the unlock and lock operations using the portable terminal 50, parcel deposit and retrieval at the home delivery box 10 can be carried out easily and reliably, as described further below in detail.

[0016]

FIG. 2 is a functional block diagram of the electric lock device 20. The electric lock device 20 is provided in each home delivery box 10 constituting the home delivery box system 100. As shown in FIG. 2, the electric lock device 20 includes a power supply section 21, control section 23, manipulation section 24, storage section 25, electric lock section 26, and communication section 27. The electric lock device 20 may also include a remaining battery charge determination section 22.

[0017]

The power supply section 21 has the function to supply operation electric power to the control section 23, storage section 25, electric lock section 26, and the like. The power supply section 21 is favorably constituted with a battery. The power supply section 21 constituted with a battery as mentioned above is provided independently for each home delivery box 10. Accordingly, the home delivery box 10 is operable without being connected to an external power supply via an electric line, and its installation work can therefore be carried out easily and speedily.

[0018]

However, at a site which permits easy wiring and connection of an external electric line to be connected to an external power supply, the home delivery box 10 may be connected with an external electric line. In that case, the battery constituting the power supply section 21 is preferably formed of a chargeable and dischargeable secondary battery, and when the remaining charge of the secondary battery falls to or below a predetermined value, the secondary battery is preferably charged with external power supplied via the external electric line.

[0019]

The remaining battery charge determination section 22 has the function to determine the remaining charge in the battery constituting the power supply section 21. Specifically, the remaining battery charge determination section 22 is able to determine the remaining charge in the power supply section 21 by detecting, with a current sensor, the

current flowing out of the power supply section 21 and adding up the detected current. The remaining battery charge can be indicated as, for example, the SOC (state of charge). A result determined by the remaining battery charge determination section 22 is input into the control section 23. When the SOC falls to or below a first threshold value (for
5 example, 20 %) set relative to 100, which is the SOC value of the battery in the unused state, the control section 23 may generate a battery replacement signal for prompting battery replacement and transmit this signal from the communication section 27 to the portable terminal 50.

[0020]

10 In that case, the battery replacement signal is transmitted from the portable terminal 50 to the server 200, and then from the server 200 to a portable terminal 50 carried by a service staff member or the like of the management company. With this arrangement, the service staff member or the like can replace the battery constituting the power supply section 21, and a situation in which the home delivery box 10 becomes unusable can be
15 avoided.

[0021]

When a single home delivery box 10 is used alone at, for example, an individual house or the like, a message prompting battery replacement may be displayed on the resident's portable terminal 50 that received the battery replacement signal to warn an
20 attention. With this arrangement, by having the resident replace the battery of the power supply section 21, a situation in which the home delivery box 10 becomes unusable can be avoided.

[0022]

When the remaining battery charge determined by the remaining battery charge
25 determination section 22 falls to or below a second threshold value (for example, SOC value of 10 %) which is lower than the first threshold value, the control section 23 may generate an unavailability signal indicating that the home delivery box 10 cannot be used,

and transmit this signal from the communication section 27 to the portable terminal 50.

In that case, by displaying a message on the portable terminal 50, the user can be informed that the home delivery box cannot be used. Here, a display unit such as a lamp for indicating unavailability may be provided on the electric lock device 20 so as to inform the user of the unavailability of the home delivery box 10.

[0023]

The control section 23 is favorably formed of, for example, a microcomputer including a CPU (central processing unit), and can read out and execute a program stored in the storage section 25. Specifically, as described above, the control section 23 has the function to generate signals such as the battery replacement signal and the unavailability signal in response to the determined result concerning the remaining battery charge transmitted from the remaining battery charge determination section 22, and to cause the communication section 27 to transmit those signals.

[0024]

The control section 23 further has the function to compare information received by the communication section 27 from the portable terminal 50 with a condition for unlocking stored in the storage section 25. When the information received from the portable terminal 50 matches the condition for unlocking, the control section 23 issues an unlock command to the electric lock section 26.

[0025]

The manipulation section 24 is composed of a push button or the like, for example. FIG. 1 and other figures show a push button having a circular shape when viewed from the front. By pressing and operating the manipulation section 24, communication is established between the communication section 27 of the electric lock device 20 and the user's portable terminal 50, and information such as box ID information and password information are transmitted and received between those two.

[0026]

The storage section 25 is composed of, for example, a ROM, a RAM, or the like. In the storage section 25, a condition for unlocking the electric lock section 26 is stored. A condition for unlocking may include password information, for example. The password information may be information that is preset and stored in the storage section 25, or may alternatively be information that is, at the time of use, transmitted from the portable terminal 50, received by the communication section 27, and stored in the storage section 25.

[0027]

In the electric lock section 26, its drive source is composed of, for example, an electromagnetic solenoid, a motor, or the like. Upon receiving an unlock command from the control section 23, the electric lock section 26 is actuated using electric power supplied from the power supply section 21. At that time, in a case where the drive source is, for example, an electromagnetic solenoid, a plunger is retracted by a coil, and the tip of the plunger is disengaged from an engagement groove or engagement recess formed in the box frame. In this way, the unlock operation is completed, and the door 14 becomes openable.

[0028]

The communication section 27 has the function to perform wireless communication with the portable terminal 50 carried by the user. As mentioned above, the communication section 27 preferably performs communication using a short-range wireless communication scheme such as Bluetooth. In particular, in the home delivery box 10 of the present embodiment in which a battery is used in the power supply section 21, it is more preferable to perform communication using BLE (Bluetooth Low Energy), which enables communication with low power consumption.

[0029]

Next, an example in which the home delivery box system 100 is configured by arranging a plurality of home delivery boxes 10 in a single unit is described with reference

to FIGs. 3A to 3D. FIG. 3A is a perspective view showing an embodiment in which a plurality of home delivery boxes 10 are assembled using a rail structure. In this embodiment, each home delivery box 10 has a pair of leg parts 16 extending in a front-rear direction on the bottom face, and also a pair of rail parts 18 extending in the front-rear direction on the top face. When viewed from the front, the pair of leg parts 16 are formed by being bent in an L-shape in a widthwise outward direction, while the pair of rail parts 18 are formed by being bent in an L-shape in a widthwise inward direction. With these features, two home delivery boxes can be assembled together by inserting, into the pair of rail parts 18 of one home delivery box 10, the pair of leg parts 16 of the other home delivery box 10 from the front toward the direction shown by arrow A. Here, after the two home delivery boxes 10 are assembled in a vertical arrangement, the two boxes are preferably fixed to each other using screws or the like.

[0030]

FIG. 3B is a front view, which partially includes broken away parts, showing an embodiment in which a plurality of home delivery boxes 10 are placed in a fixed state using bolts and nuts. In FIG. 3B, each door 14 is depicted in a partially broken away form. As shown in FIG. 3B, the home delivery box system 100 is configured by arranging six home delivery boxes 10 on a mounting base 12 in three rows by two columns. The home delivery boxes 10 are such that, by means of bolts 17 and nuts 19, adjacent bottom and top faces are coupled to each other, and adjacent side faces are coupled to each other. The home delivery boxes 10 may be coupled to one another in this manner to form a single unit.

[0031]

FIG. 3C is a perspective view showing an embodiment in which a plurality of home delivery boxes 10 are secured to a pole structure 2. In the home delivery box system 100 shown in FIG. 3C, four home delivery boxes 10 are arranged in two rows by two columns. In the same manner as described with reference to FIG. 3B, the home delivery boxes 10 are

coupled to each other using bolts and nuts to form a single unit. Further, by means of screws or the like, the home delivery boxes 10 are secured to the pole structure 2 having a shape of a gate when viewed from the front. The two leg parts of the pole structure 2 are each arranged to stand on, for example, a pedestal 3 made of concrete.

5 [0032]

FIG. 3D is a perspective view showing an embodiment in which a plurality of home delivery boxes 10 are mounted on a wall surface 4. In the home delivery box system 100 shown in FIG. 3D, four home delivery boxes 10 are arranged in two rows by two columns. In the same manner as described with reference to FIG. 3B, the home delivery boxes 10 are coupled to each other using bolts and nuts to form a single unit. Further, by means of screws (for example, self-drilling screws) that are screwed into the rear face located opposite to the door 14, the home delivery boxes 10 are fixed on the wall surface 4.

[0033]

Next, an example of use of the home delivery box system 100 is described below with reference to FIG. 4. In FIG. 4, (a)~(f) are diagrams illustrating a procedure performed at the time of parcel deposit, and (g)~(l) are diagrams illustrating a procedure performed at the time of parcel retrieval.

[0034]

First, a case in which a delivery person, as a user, of a parcel delivery company, deposits a parcel N in the home delivery box system 100 is described with reference to (a)~(f) of FIG. 4. In this case, a dedicated application is downloaded and stored in the delivery person's portable terminal 50, and by using this dedicated application the operation for unlocking the home delivery box 10 can be carried out.

[0035]

25 First, as shown in FIG. 4(a), the delivery person who brought the parcel N starts up the dedicated application in the portable terminal 50a carried by the delivery person, and causes communication to be performed with the server 200 (see FIG. 1) so as to check for

vacant boxes. In the server 200, the status of use (i.e., box inner size, box use status, etc.) of all home delivery boxes 10 constituting the home delivery box system 100 is stored and managed. From the server 200, vacant box information indicating which home delivery boxes 10 are available for use is transmitted to the delivery person's portable terminal 50a.

5 As a result, a schematic image or the like showing the vacant boxes is displayed on the screen of the delivery person's portable terminal 50a, and it is thereby possible to check which home delivery boxes 10 can be used.

[0036]

Subsequently, as shown in FIG. 4(b), the delivery person transmits a parcel number
10 assigned to the parcel N from the portable terminal 50a to the server 200. The parcel number can, for example, be captured into the portable terminal 50a by reading, with a camera of the portable terminal 50a, a barcode, QR Code (registered trademark), or the like shown on a delivery slip attached to the parcel N.

[0037]

15 Upon receiving the parcel number transmitted from the delivery person's portable terminal 50a, the server 200 selects, from among the vacant boxes, a home delivery box 10 in which the parcel N should be deposited, and transmits box ID information designating the position of the selected home delivery box 10 to the delivery person's portable terminal 50a. At that time, the server 200 transmits password information together with the box
20 ID information.

[0038]

On the screen of the delivery person's portable terminal 50a that received the box ID information, the designated home delivery box is displayed while being marked with a star, and the delivery person can thereby know the specific home delivery box 10 in which the
25 parcel N should be deposited. FIG. 4(c) shows an example in which the home delivery box 10 in the right column and the second row from the top, when viewed from the front, is designated.

[0039]

Subsequently, as shown in FIG. 4(d), the delivery person presses the push button 24 of the designated home delivery box 10. This establishes BLE communication between the communication section 27 (see FIG. 2) of the electric lock device 20 of the designated home delivery box 10 and the delivery person's portable terminal 50a, and an unlock request and the password information are transmitted from the portable terminal 50a to the communication section 27.

[0040]

In the electric lock device 20 of the home delivery box 10 in which the communication section 27 received the unlock request and the password information, the control section 23 transmits an unlock command to the electric lock section 26, and also stores the password information in the storage section 25. As a result, the electric lock section 26 performs the unlock operation, and the door 14 is opened as shown in FIG. 4(e). The delivery person can then deposit the parcel N in the home delivery box 10.

[0041]

After depositing the parcel N inside the home delivery box 10, the delivery person closes the door 14. At that point, having detected the closing of the door 14 using a sensor (not shown) or the like, the electric lock device 20 causes the electric lock section 26 to perform the lock operation so as to lock the door 14. Further, as shown in FIG. 4(f), the control section 23 of the electric lock device 20 transmits, via the communication section 27, a lock notification (that is, a deposit completion notification) to the delivery person's portable terminal 50a. Upon receipt of this, the delivery person's portable terminal 50a transmits a deposit completion notification to the server 200. Upon receiving this deposit completion notification, the server 200 may store, in correlation with the previously-transmitted parcel number, information indicating the completion of deposit of the parcel N, and may provide a display regarding the deposit completion in the dedicated application.

[0042]

Here, in a case where the user depositing the parcel in the home delivery box system 100 is alternatively an individual who wishes to send out a parcel, the sender can deposit the parcel in the home delivery box system 100 in a similar manner using the sender's portable terminal. In this case, the sender's personal information such as the name, address, and credit card number are registered in advance in the server 200 via the dedicated application. Accordingly, when the sender starts up this dedicated application in the portable terminal and is performing a parcel deposit operation, a notification of a delivery fee based on the size, destination, and the like of the parcel is provided to the sender's portable terminal 50. When the sender, after having performed an operation for expressing agreement to this notification, completes deposit of the parcel in the home delivery box, the server 200 can have the delivery fee payment settled using, among others, the credit card. In that case, the server 200 transmits a payment completion notification to the sender's portable terminal.

[0043]

Next, a case in which a recipient, who corresponds to the user, retrieves a parcel N at the home delivery box system 100 is described with reference to (g)~(l) of FIG. 4. In this case, a dedicated application is downloaded and stored in the recipient's portable terminal 50b, and by using this dedicated application the operation for unlocking the home delivery box 10 can be carried out. The recipient in this case may be the consignee to whom the parcel was sent, or may alternatively be the delivery company that accepts the parcel deposited in the home delivery box for sending out.

[0044]

When the parcel N is deposited in the home delivery box system 100 as described above with reference to (a)~(f) of FIG. 4, notification information showing "PARCEL HAS ARRIVED" is transmitted from the server 200 to the recipient's portable terminal 50b, as shown in FIG. 4(g). This notification information is arranged to be transmitted to

the recipient's email address registered in advance. The notification information also includes the password information that was set at the time of parcel deposit.

[0045]

5 The recipient who received the notification information can know in which home delivery box 10 the parcel N is deposited via, for example, a schematic representation of the home delivery box system displayed in the dedicated application, as shown in FIG. 4(h).

[0046]

10 Subsequently, when the recipient presses and operates the push button 24 of the designated home delivery box 10 as shown in FIG. 4(i), BLE communication is established between the communication section 27 (see FIG. 2) of the electric lock device 20 of the home delivery box 10 and the recipient's portable terminal 50b, and an unlock request and the password information are transmitted from the portable terminal 50b to the communication section 27.

15 [0047]

In the electric lock device 20 of the home delivery box 10 in which the communication section 27 received the unlock request and the password information, the control section 23 performs authentication by determining whether the received password information matches the password information stored in the storage section 25. When authentication succeeds as a result of a match of the password information, the control section 23 transmits, to the recipient's portable terminal 50b via the communication section 27, information for displaying a screen image that prompts confirmation regarding retrieval, as shown in FIG. 4(j).

[0048]

25 When the recipient expresses intention to "RETRIEVE" by performing a touch operation or the like on the screen displaying a retrieval confirmation image as noted above, information to that effect is transmitted from the portable terminal 50b to the

communication section 27 and input into the control section 23. When this retrieval confirmation information is input, the control section 23 transmits an unlock command to the electric lock section 26 of the home delivery box 10. As a result, the electric lock section 26 performs the unlock operation, and the door 14 is opened as shown in FIG. 4(k).

5 The recipient can then take out and receive the parcel N from the home delivery box 10. At the same time as the issuance of the unlock command to the electric lock section 26, the password information that was stored in the storage section 25 is released (that is, deleted).
[0049]

After taking out the parcel N from inside the home delivery box 10, the recipient
10 closes the door 14. At that point, having detected the closing of the door 14 using a sensor (not shown) or the like, the electric lock device 20 causes the electric lock section 26 to perform the lock operation so as to lock the door 14. Further, as shown in FIG. 4(l), the control section 23 of the electric lock device 20 transmits, via the communication section 27, a receipt completion notification (that is, a retrieval completion notification) to
15 the recipient's portable terminal 50b. Upon receipt of this, the recipient's portable terminal 50b transmits a retrieval completion notification to the server 200. Upon receiving this retrieval completion notification, the server 200 stores information indicating that this home delivery box is a vacant box.

[0050]

20 Here, there may be cases in which a parcel N is delivered by cash-on-delivery. In such case, at the point the recipient performs the retrieval confirmation of FIG. 4(j), credit card payment or the like may be processed in the server 200. Subsequently, when completion of the payment is confirmed at the control section 23 of the electric lock device 20 from the server 200 via the recipient's portable terminal 50b and the communication
25 section 27, the control section 23 may output the unlock command to the electric lock section 26.

[0051]

As described above, the present embodiment is an electric lock device 20 installed in a door 14 of a home delivery box 10, and includes: a power supply section 21 provided independently for each home delivery box 10; an electric lock section 26 that unlocks the door 14 using electric power supplied from the power supply section 21; a communication section 27 that communicates with a portable terminal 50 carried by a user of the home delivery box 10; a storage section 25 that stores password information or the like, which is a condition for unlocking; and a control section 23 that compares information received by the communication section 27 from the portable terminal 50 with the condition for unlocking stored in the storage section 25. The control section 23 issues an unlock command to the electric lock section 26 when the information received from the portable terminal 50 matches the condition for unlocking.

[0052]

According to this configuration, there is no need to use a numeric keypad or the like to manually input the condition for unlocking such as the password information, and the operation for unlocking the door of the home delivery box can be carried out easily and reliably using the portable terminal.

[0053]

Further, since the power supply section is provided independently for each home delivery box, installation is possible without connecting to an external power supply, so that work for installing a home delivery box having the present electric lock device, as well as work for installing a home delivery box system configured by arranging a plurality of such home delivery boxes, can be carried out easily and speedily.

[0054]

Further, since each home delivery box 10 includes the communication section 27, and since it is sufficient to simply perform communication with the portable terminal 50 carried by the user, there is no need to provide a communication function or to connect an external communication line to the home delivery box system 100 itself. Accordingly,

also for this reason, work for installing the home delivery box system can be carried out easily and speedily.

[0055]

The electric lock device 20 of the present embodiment may further include a
5 remaining battery charge determination section 22 that determines remaining battery charge in the power supply section 21, and the remaining battery charge determination section 22 may output a determined result to the control section 23. According to this configuration, the control section 23 can monitor the remaining battery charge in the power supply section 21, and can take measures before battery depletion occurs.

10 [0056]

In this case, when the remaining battery charge in the power supply section 21 falls to or below a first threshold value, the control section 23 may generate a battery replacement signal and transmit this signal from the communication section 27 to the portable terminal 50. According to this arrangement, battery replacement can be
15 prompted when the remaining battery charge in the power supply section 21 becomes low, and a situation in which the home delivery box 10 having the electric lock device 20 becomes unusable due to battery depletion can be avoided.

[0057]

Further, when the remaining battery charge in the power supply section 21 falls to or
20 below a second threshold value which is lower than the first threshold value, the control section 23 may generate an unavailability signal and transmit this signal from the communication section 27 to the portable terminal 50. According to this arrangement, the user can be informed that the home delivery box 10 is in an unusable state due to insufficient remaining battery charge in the power supply section 21.

25 [0058]

According to a home delivery box 10 incorporating the electric lock device 20 of the present embodiment, there is no need to use a numeric keypad or the like to manually input

the condition for unlocking such as the password information, and the operation for unlocking the door of the home delivery box can be carried out easily and reliably using the portable terminal. Further, since the power supply section is provided independently for each home delivery box 10, installation is possible without connecting to an external power supply, so that work for installing the home delivery box 10 having the present electric lock device 20 can be carried out easily and speedily.

[0059]

According to a home delivery box system 100 configured by arranging a plurality of home delivery boxes of the present embodiment in at least one of a vertical direction and a horizontal direction, advantages similar to those of the above-described home delivery box 10 can be achieved. Further, since each home delivery box 10 includes an independent power supply section 21, there is no need to electrically connect each home delivery box 10 when forming the home delivery box system 100, so that, advantageously, work for assembling the home delivery box system 100 is facilitated.

[0060]

The electric lock device, home delivery box, and home delivery box system according to the present disclosure are not limited to the above-described embodiments and their variants, and it is apparent that various changes and improvements are possible within the scope of subject matters described in the claims of the present application.

REFERENCE SIGNS LIST

[0061]

2 pole structure; 3 pedestal; 4 wall surface; 10 home delivery box; 12 mounting base; 13 screw; 14 door; 16 leg part; 17 bolt; 18 rail part; 19 nut; 20 electric lock device; 21 power supply section; 22 remaining battery charge determination section; 23 control section; 24 manipulation section or push button; 25 storage section; 26 electric lock section; 27 communication section; 50, 50a, 50b portable terminal; 100 home delivery box

system; 200 server; N parcel.

CLAIMS

[Claim 1]

An electric lock device installed in a door of a home delivery box, comprising:
5 a power supply section provided independently for each home delivery box;
an electric lock section that unlocks the door using electric power supplied from the power supply section;

a communication section that communicates with a portable terminal carried by a user of the home delivery box;

10 a storage section that stores a condition for unlocking; and

a control section that compares information received by the communication section from the portable terminal with the condition for unlocking stored in the storage section, wherein

the control section issues an unlock command to the electric lock section when the
15 information received from the portable terminal matches the condition for unlocking.

[Claim 2]

The electric lock device according to claim 1, further comprising a remaining battery charge determination section that determines remaining battery charge in the power supply section, wherein the remaining battery charge determination section outputs a determined
20 result to the control section.

[Claim 3]

The electric lock device according to claim 2, wherein when the remaining battery charge in the power supply section falls to or below a first threshold value, the control section generates a battery replacement signal and transmits this signal from the
25 communication section to the portable terminal.

[Claim 4]

The electric lock device according to claim 3, wherein when the remaining battery

charge in the power supply section falls to or below a second threshold value which is lower than the first threshold value, the control section generates an unavailability signal and transmits this signal from the communication section to the portable terminal.

[Claim 5]

5 A home delivery box incorporating the electric lock device according to any one of claims 1 to 4.

[Claim 6]

 A home delivery box system configured by arranging a plurality of the home delivery box according to claim 5 in at least one of a vertical direction and a horizontal
10 direction.