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LOCKER APPARATUS

Abstract

In a locker apparatus, a control device locks a locking device in order to bring a door into a closed state except when luggage is deposited in a box and when the luggage is taken out from the box. An operation unit includes a take-out button that is operated in order to take out the luggage from the box in which the luggage has been deposited. When the take-out button is operated, the control device unlocks the locking device in order to open the door of the box in which the luggage has been deposited, and when the door is closed thereafter and it is determined that there is the luggage in the box based on a detection result of a luggage sensor, the control device maintains unlocking of the locking device.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No. 2024-018012, filed Feb. 8, 2024, the entire contents of which are incorporated herein by reference.

BACKGROUND

Technical Field

[0002] The technique disclosed in this specification relates to a locker apparatus that includes a box capable of accommodating luggage therein, a door for opening and closing the box, and a locking device for unlockably locking the door.

Related Art

[0003] Conventionally, as this type of technique, for example, the techniques described in Japanese Utility Model Registration No. 3113126 (JP3113126U), Japanese Utility Model Registration No. 3113263 (JP3113263U), and Japanese Utility Model Registration No. 3220448 (JP3220448U) have been known. JP3113126U, JP3113263U, and JP3220448U each describe technique related to a normally closed-type coin locker that provisionally locks each door at all times when not in use.

[0004] Generally, conventional coin lockers are normally opened-type coin lockers in which each door is not locked when no luggage is deposited therein. Therefore, rubbish is sometimes thrown into boxes, or the boxes are sometimes used as luggage storage areas without permission, so that there are problems in terms of hygiene and crime prevention, and installation companies are forced to manage and handle these problems. In contrast, in each of the normally closed-type coin lockers described in JP3113126U, JP3113263U, and JP3220448U, each door is provisionally locked even when no luggage is deposited therein, which can reduce the burden of the above management and handling.

[0005] In recent years, as normally closed-type coin lockers, a type of locker apparatus in which a locking device is electrically activated and operated to be locked and unlocked without using a physical key, has become the mainstream. For example, a user checks an available box by a number at an operation unit provided in a locker apparatus, designates the number, and performs a payment operation for a usage fee. JP3113126U and JP3113263U each describe a payment method by cash, and JP3220448U describes a payment method by a credit card or the like. When the locker apparatus confirms payment of the usage fee in response to this payment operation, the locking device of the designated box is unlocked, the door opens, and it becomes possible to deposit luggage. When the user deposits luggage, closes the door, and confirms the operation, the locking device is locked. When the luggage is deposited as described above, a note on which the number of the designated box is recorded is issued to the user for convenience in taking out the luggage. For example, JP3113126U and JP3113263U each state that in depositing luggage, a receipt with a bar code is issued as a note from the locker apparatus, and in taking out the luggage, the user is authenticated by holding the issued receipt over a bar code reader, the locking device of the designated box is unlocked, and the door is opened. Meanwhile, JP3220448U states that by using a two-dimensional code such as a serial number code, a bar code, or a QR code (registered trademark) instead of a receipt, the user is authenticated and the locking device is unlocked.

SUMMARY

Technical Problems

[0006] In each of the normally closed-type locker apparatuses described in JP3113126U, JP3113263U, and JP3220448U, in order for the user to take out luggage from the box, the user

unlocks the locking device of the designated box, opens the door, and then takes out the luggage. In such a case, for example, immediately after a user (A) takes out luggage from a box (X), a later user (B) may hurriedly place luggage into the box (X) by mistake before the door is closed. In this case, when the door is closed, the locking device is locked as a normal standby operation in the normally closed-type locker apparatus, and the door is locked. That is, in this state, since this locking is after the previous user (A) took out the luggage, the box (X) in which the later user (B) placed the luggage is regarded as an empty box, and the door is locked. Therefore, thereafter, another user (C) may select the box (X) as an available empty box, and if the locking device of the box (X) is unlocked, the door opens to allow the luggage in the box (X) to be taken out, which causes a security problem.

[0007] The disclosed technique has been made in view of the above circumstances, and an object of the disclosed technique is to provide a locker apparatus that can prevent a door from being locked even if a later user tries to deposit luggage by mistake in a box from which a previous user has taken out luggage.

Means of Solving the Problems

[0008] (1) In order to achieve the above object, one aspect of the disclosed technique is directed to a locker apparatus including: a box capable of accommodating luggage therein; a door configured to open and close the box; a locking device configured to unlockably lock the door; an operation unit configured to receive an operation by a user; and a control device configured to control the locking device in response to an operation on the operation unit by the user, wherein the control device is configured to lock the locking device in order to lock the door into a closed state except when the luggage is deposited in the box and when the luggage is taken out from the box, the box is provided with a luggage sensor configured to detect luggage in the box, the operation unit includes a take-out button that is operated by the user in order to take out the luggage from the box in which the user has deposited the luggage, and when the take-out button is operated by the user, the control device unlocks the locking device in order to open the door of the box in which the luggage has been deposited, and when the door is closed thereafter and it is determined that there is the luggage in the box based on a detection result of the luggage sensor, the control device maintains unlocking of the locking device.

[0009] According to the above configuration (1), when the take-out button is operated by the user in order to take out luggage from the box in which the user has deposited the luggage, the locking device is unlocked in order to open the door of the box in which the luggage has been deposited. When the door is closed thereafter, the unlocking of the locking device is maintained when it is determined that there is luggage in the box based on the detection result of the luggage sensor. Therefore, when a user takes luggage from the box in which the user has deposited the luggage, even if a later user deposits luggage in the box by mistake and closes the door, the locking device is not locked.

[0010] (2) In order to achieve the above object, in the above configuration (1), preferably, a luggage lamp configured to operate in order to indicate whether or not there is the luggage in the box is further included, and the control device causes the luggage lamp to light up or flash while determining that there is the luggage in the box as a target based on the detection result of the luggage sensor after the take-out button is operated by the user.

[0011] According to the above configuration (2), in addition to the action of the above configuration (1), the luggage lamp lights up or blinks while it is determined that there is the luggage in the target box based on the detection result of the luggage sensor after the take-out button is operated by the user. Therefore, even if a later user deposits luggage in this box by mistake, the mistaken deposit is notified to the later user.

[0012] (3) In order to achieve the above object, in the above configuration (1) or (2), preferably, reservation acceptance member configured to accept a use reservation for the box is further included, the control device is configured to record and manage a current status of each box that is

in use and each box that is not in use, and to manage acceptance and recording of a use reservation from the reservation acceptance member for each box that is not in use, and the control device stops accepting a use reservation from the reservation acceptance member for the box in which it is determined that there is the luggage based on the detection result of the luggage sensor.

[0013] According to the above configuration (3), in addition to the action of the above configuration (1) or (2), the control device manages the use status of each box, and also manages acceptance and recording of a use reservation for each box that is not in use. Here, when a user takes out luggage from a box in which the user has deposited the luggage, this box appears to be empty once. However, the control device stops accepting a use reservation for each box in which it is determined that there is luggage based on the detection result of the luggage sensor. Therefore, when a user takes out luggage from a box, even if a later user deposits luggage in this box by mistake and another user tries to make a use reservation for this box at the same time, the reservation is not accepted.

[0014] According to the above configuration (1), even if a later user deposits luggage by mistake in the box from which a previous user took out luggage, the door can be prevented from being locked.

[0015] According to the above configuration (2), in addition to the effect of the above configuration (1), a later user can recognize mistaken deposit of luggage early and take action therefor.

[0016] According to the above configuration (3), in addition to the effect of the above configuration (1) or (2), even if a later user deposits luggage by mistake in the box from which a previous user took out luggage, still another user can be prevented from making a use reservation for this box.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a front view showing a locker apparatus according to a first embodiment;

[0018] FIG. 2 is a block diagram showing the electrical configuration of the locker apparatus according to the first embodiment;

[0019] FIG. 3 shows a standby screen displayed on a display unit when a luggage take-out mode is executed according to the first embodiment;

[0020] FIG. 4 shows an authentication selection screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0021] FIG. 5 shows an authentication execution screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0022] FIG. 6 shows an authentication execution screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0023] FIG. 7 shows an authentication execution screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0024] FIG. 8 shows a box selection screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0025] FIG. 9 shows a take-out confirmation screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0026] FIG. 10 shows a redeposit confirmation screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0027] FIG. 11 shows a box unlocking screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0028] FIG. 12 shows an end screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0029] FIG. 13 shows a first warning screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;

[0030] FIG. **14** shows a second warning screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;
[0031] FIG. **15** shows a box unlocking screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment;
[0032] FIG. **16** shows an end screen displayed on the display unit when the luggage take-out mode is executed according to the first embodiment; and
[0033] FIG. **17** shows a warning screen displayed on a display unit when a luggage take-out mode is executed according to a second embodiment.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0034] Hereinafter, embodiments in which the locker apparatus of the disclosed technique is embodied will be described in detail with reference to the drawings.

First Embodiment

[0035] First, a first embodiment will be described.

(Outline of Configuration of Locker Apparatus)

[0036] FIG. **1** shows a locker apparatus **1** in a front view. FIG. **2** shows the electrical configuration of the locker apparatus **1** in a block diagram. The locker apparatus **1** of this embodiment is installed on the premises of a railroad station and used to temporarily deposit and keep luggage, for example.

[0037] As shown in FIG. **1**, the locker apparatus **1** includes a housing **10**, a plurality of boxes **11** that are capable of accommodating luggage in the housing **10**, an operation unit **20** for receiving an operation by a user in order for the user to place or take out luggage in or from a box **11**, and a control device **30** that controls opening/closing, locking/unlocking, etc., of each box **11** and display, etc., of the operation unit **20** in response to operations on the operation unit **20** by the user.

(Configuration of Boxes)

[0038] As shown in FIG. **1**, the locker apparatus **1** includes the plurality of boxes **11** each capable of accommodating luggage of the user therein. Specifically, as shown in FIG. **1**, the locker apparatus **1** schematically includes a total of 24 boxes **11** in 2 rows×12 columns, and the two rightmost columns on the upper row and the rightmost one column on the lower row in FIG. **1** include a plurality of small boxes **11a** each having a small frontage. The numbers of boxes **11** and small boxes **11a** of this embodiment are merely an example, and can be increased or decreased as necessary. In addition, the locker apparatus **1** of this embodiment includes the plurality of boxes **11** and small boxes **11a** having different frontages as shown in FIG. **1**, but all of the plurality of boxes can also be configured with the same frontage.

[0039] At the front opening of each box **11** or **11a**, a door **12** that can be opened and closed independently for each box **11** or **11a** is provided. A box number (0001 to 0031) is attached to the surface of each door **12** to specify the corresponding box **11** or **11a**. In this embodiment, each door **12** is, for example, a left-opening door that opens to the left of the box **11** or **11a** in the drawing, but may also be a right-opening door that opens to the right of the box **11** or **11a** in the drawing. A locking device **13** (see FIG. **2**) described later is provided inside each box **11** or **11a**. In this embodiment, the description of the specific configuration of the locking device **13** is omitted. In addition, each box **11** or **11a** is provided with a luggage sensor **40** (see FIG. **2**) for detecting luggage in this box **11** or **11a**. As the luggage sensor **40**, for example, a contact type sensor that detects the presence or absence of luggage by detecting the weight of the luggage, or a non-contact type sensor that detects the presence or absence of luggage by detecting the reflection of light waves or the like on the luggage, can be used.

[0040] The door **12** of each box **11** or **11a** is provided with a lever **14** that is operated by the user in order to request the locking device **13** to lock when the user has deposited luggage in the box **11** or **11a** and has closed the door **12**. In FIG. **1**, for convenience, the levers **14** are shown only on the doors **12** with door numbers of “0001” and “0002”, but omitted their illustration on the other doors **12**.

(Configuration of Operation Unit)

[0041] As shown in FIG. 1, the operation unit **20** includes a camera **21** for recognizing users, a display unit **22** with a liquid crystal screen for exchanging information with users, a QR code reader **23** for reading data such as QR codes (registered trademark) from users, a settlement terminal **24** that can read IC tags incorporated into cash cards, and a printer **26** for printing a receipt or the like for proof of use. Data input from users can be performed using the QR code reader **23** and the settlement terminal **24**. Here, a cash card is, for example, a card that allows settlement of electronic money, such as a transportation IC card. The display unit **22**, the QR code reader **23**, and the settlement terminal **24** of the operation unit **20** correspond to “authentication member” for authenticating the user. The display unit **22** is configured to display at least one of a virtual button, an illustration of a locker apparatus, and a text, as described later.

(Configuration of Control Device)

[0042] The control device **30** is provided inside the operation unit **20**, and is configured to control the locking device **13** of each box **11** or **11a** in response to an operation on the operation unit **20** by the user. As shown in FIG. 2, the control device **30** includes a CPU **31** and a memory **32**. For example, a deposit program **32a** for performing control when luggage is to be deposited in a box **11** or **11a** and a take-out program **32b** for performing control when luggage is to be taken out from a box **11** or **11a** are stored in the memory **32**. The control device **30** is electrically connected to each locking device **13**, each lever **14**, and the operation unit **20**, and is configured to perform control of each locking device **13**, screen display of the display unit **22**, etc., based on the deposit program **32a** or the take-out program **32b**. In FIG. 2, only one locking device **13** is shown for convenience, but in actuality, locking devices **13** whose number is equal to the number of boxes **11** and **11a** are connected to the control device **30**. In addition, a communication unit **50** is connected to the control device **30**, and the locker apparatus **1** is capable of communicating with a management apparatus (not shown) via the communication unit **50**. The management apparatus is an apparatus that is installed on the premises of a station or any other predetermined location and is higher in rank than the locker apparatus **1**. In this embodiment, the communication unit **50** corresponds to an example of “reservation acceptance member” for accepting use reservations for the boxes **11** and **11a**. The control device **30** is configured to record and manage the current statuses of the boxes **11** and **11a** that are in use and the boxes **11** and **11a** that are not in use, and to manage acceptance and recording of use reservations from the communication unit **50** for the boxes **11** and **11a** that are not in use, and a reservation program **32c** therefor is provided in the memory **32**. Furthermore, each luggage sensor **40** is connected to the control device **30**. The control device **30** is configured to determine whether or not there is luggage in each box **11** or **11a**, based on a detection result from the luggage sensor **40**. In FIG. 2, only one luggage sensor **40** is shown for convenience, but in actuality, luggage sensors **40** whose number is equal to the number of boxes **11** and **11a** are connected to the control device **30**. Furthermore, the control device **30** is configured to stop accepting a use reservation from the communication unit **50** (reservation acceptance member) for each box **11** or **11a** in which it is determined that there is luggage based on the detection result of the luggage sensor **40**.

[0043] The control device **30** is configured to automatically open and close the door **12** of each box **11** or **11a** by controlling the locking device **13**. In addition, each locking device **13** of this embodiment normally locks each door **12** into a closed state. When each door **12** is to be opened, the door **12** is opened manually, and when each door **12** is to be closed, the door **12** is closed manually or automatically by a spring or the like.

[0044] The locker apparatus **1** of this embodiment is a so-called “normally closed-type locker apparatus”, and the control device **30** is configured to lock each locking device **13** in order to lock the door **12** into a closed state except when the user deposits luggage in the box **11** or **11a** and when the user takes out luggage from the box **11** or **11a**.

(Luggage Deposit Procedure)

[0045] Next, the procedure for the user to deposit luggage in the locker apparatus **1** will be described.

[0046] A state where no luggage is accommodated (state where the user can deposit luggage) in the plurality of boxes **11** and **11a** is referred to as “standby mode”. Each box **11** or **11a** in the standby mode is in a locked state. At this time, the locking device **13** locks the door **12** of the box **11** or **11a** into a closed state.

[0047] In the standby mode, in order to deposit luggage in the box **11** or **11a**, the user first performs acceptance of the start of use by using the operation unit **20**. The control device **30** displays a virtual button for selecting deposit, on the display unit **22**, and starts the acceptance by the user tapping the virtual button. At this time, the control device **30** can notify the user of each available empty box **11** or **11a** by displaying a door number thereof based on the detection result of the luggage sensor **40**. Here, the virtual button is an illustration displayed on the display unit **22**, and is a button that functions electrically when the user taps the button on the screen.

[0048] Then, the control device **30** displays a usage fee on the display unit **22**. The user who has confirmed the fee enters use data and settles the fee using the QR code reader **23** and the settlement terminal **24**. In the settlement, for example, the unique number of the IC tag of an IC card read by the settlement terminal **24** is stored in the memory **32**, and this data is used for authentication when luggage is to be taken out. After the settlement is performed, the control device **30** prints a receipt as a certificate of use using the printer **26**. The settlement is not limited to the form using an IC card, and may be another form such as credit card settlement or QR code settlement, or a plurality of forms may be selectively combined. In addition, when settlement is performed by a method other than an IC card, a private code such as a QR code (registered trademark) for unlocking can be printed on a receipt, and authentication can be performed by reading the printed private code.

(Luggage Take-Out Procedure)

[0049] Next, the procedure for the user to take out luggage from the locker apparatus **1** will be described.

[0050] In order to take out luggage from the locker apparatus **1**, the user enters necessary data into the operation unit **20**. The control device **30** displays a virtual button for selecting take-out on the display unit **22**, and starts the acceptance by the user tapping the virtual button. At this time, if the daily usage fee for the locker apparatus **1** is exceeded, for example, if the locker apparatus **1** has been used over two days, the excess fee is deducted by credit card settlement, cashless settlement, or the like to complete payment. After the payment is completed, the control device **30** unlocks the locking device **13** to open the door **12** of the box **11** or **11a**. The user takes out the luggage from the box **11** or **11a** and closes the door **12**. At this time, the control device **30** locks the locking device **13** to lock the door **12** of the box **11** or **11a** into a closed state.

(Technical Features of Locker Apparatus of this Embodiment)

[0051] In order to solve the problems of the conventional normally closed-type locker apparatuses described above, the normally closed-type locker apparatus **1** of this embodiment is configured to be able to execute a “luggage take-out mode” for, immediately after a previous user takes out luggage from a box **11** or **11a**, preventing a door **12** from being locked even if a later user tries to deposit luggage by mistake in this box **11** or **11a**.

(Operation of Luggage Take-Out Mode)

[0052] In this embodiment, the control device **30** is configured to sequentially transition the screen of the display unit **22** from a predetermined “standby screen” in response to an operation on a virtual button by the user. FIG. **3** to FIG. **16** each show a transition screen displayed on the display unit **22** when the “luggage take-out mode” is executed. The control device **30** controls interactive screen transitions on the display unit **22** related to the “luggage take-out mode” based on the preset take-out program **32b**.

[0053] First, when the user faces the display unit **22** of the operation unit **20**, the control device **30** displays a “standby screen” shown in FIG. **3** on the display unit **22**. A plurality of virtual buttons **60**

that can be tapped are displayed on the standby screen. A deposit button **61** that is operated by the user when the user deposits luggage in a box **11** or **11a**, a take-out button **62** that is operated by the user in order to take out luggage from a box **11** or **11a** in which the user has deposited the luggage, and a reopening door button **63** that can be operated by the user to give an instruction to reopen a door **12** are displayed in the upper part of the standby screen. The reopening door button **63** is a button that is operated by the user particularly when the user redeposits luggage in a box **11** or **11a**, not for taking out luggage from a box **11** or **11a**. In this embodiment, redeposit of luggage through an operation on the reopening door button **63** can be performed within a “15-minute time limit”. On the standby screen, the deposit button **61** and the take-out button **62** are displayed side by side, and the reopening door button **63** is placed adjacent to the upper side of the take-out button **62**. The width of the reopening door button **63** is substantially equal to that of the take-out button **62**, and the height of the reopening door button **63** is smaller than that of the take-out button **62**. By this size setting, the take-out button **62** for take-out of luggage which occurs more frequently than redeposit of luggage is made more conspicuous than the reopening door button **63** to eliminate mistakes in button operation. In addition, a reservation deposit button **64** for instructing reservation deposit, reception, and shipping of luggage is displayed in the middle part of the standby screen. Furthermore, an operator menu button **65** for selecting a luggage handling business operator, a usage button **66** for instructing explanation of the usage and designating a box size, and a language button **67** for selecting a display language are displayed in the lower part of the standby screen. [0054] On the standby screen, the user taps the reopening door button **63** when executing the “reopening door mode”. In this embodiment, a door **12** can be opened again without any fee within a predetermined time immediately after luggage is deposited. In this embodiment, “within 15 minutes” is set as within the predetermined time. In addition, in this embodiment, each door **12** is set such that the door **12** can be opened multiple times “within 15 minutes”.

[0055] On the standby screen, the user taps the take-out button **62** in order to execute the “luggage take-out mode” and take out luggage.

[0056] If the take-out button **62** is tapped, the control device **30** causes the display of the display unit **22** to transition to an “authentication selection screen” shown in FIG. 4. On the authentication selection screen, a text or the like, and a plurality of virtual buttons **60** that can be tapped are displayed in order to select an authentication method. A text “Take out” is displayed in the upper part of the authentication selection screen. In addition, a plurality of types of authentication buttons for selecting one of a plurality of authentication methods are displayed in the middle part of the authentication selection screen. That is, as the authentication buttons, an IC card button **71** for selecting the use of an IC card, a QR code button **72** for selecting the use of a QR code (registered trademark), and a number entry button **73** for selecting number entry are displayed in the middle part of the authentication selection screen. In addition, a cancellation button **68** for cancelling an operation, a usage button **74** for instructing explanation of the usage, and a language button **67** are displayed in the lower part of the authentication selection screen.

[0057] A payment method in depositing luggage differs depending on the user, and thus the user taps a suitable one from among the various buttons **71** to **73**.

[0058] Here, if the IC card button **71** is tapped, the control device **30** causes the display of the display unit **22** to transition from the authentication selection screen to an “authentication execution screen” shown in FIG. 5. On the authentication execution screen, a text or the like, an illustration, and virtual buttons **60** that can be tapped are displayed. A text “IC card authentication” is displayed in the upper part of the authentication execution screen. In addition, an illustration prompting an operation on the authentication member corresponding to a selected one authentication method, and an explanation text therefor are displayed in the middle part of the authentication execution screen. That is, an explanation text “Please touch settlement terminal with IC card”, and an illustration representing this are displayed in the middle part of the authentication execution screen. In addition, a cancellation button **68** and a back button **70** are displayed in the lower part of the

authentication execution screen.

[0059] Meanwhile, if the QR code button **72** is tapped, the control device **30** causes the display of the display unit **22** to transition to an “authentication execution screen” shown in FIG. **6**. On the authentication execution screen, a text or the like, an illustration, and virtual buttons **60** that can be tapped are displayed. A text “QR code authentication” is displayed in the upper part of the authentication execution screen. In addition, an explanation text “Please hold QR code over scanner”, and an illustration representing this are displayed in the middle part of the authentication execution screen. In addition, a cancellation button **68** and a back button **70** are displayed in the lower part of the authentication execution screen.

[0060] If the number entry button **73** is tapped, the control device **30** causes the display of the display unit **22** to transition to an “authentication execution screen” shown in FIG. **7**. On the authentication execution screen, a text or the like, an illustration, and virtual buttons **60** that can be tapped are displayed. A text “Number authentication” is displayed in the upper part of the authentication execution screen. In addition, an explanation text “Please enter 6-digit reservation number”, a ten-key button **75** as authentication member for entering a number, a small display **76** for displaying the entered number, and a confirmation button **69** are displayed in the middle part of the authentication execution screen. In addition, a cancellation button **68** and a back button **70** are displayed in the lower part of the authentication execution screen.

[0061] The user performs authentication in accordance with the authentication method corresponding to one selected screen out of the three authentication execution screens described above.

[0062] Here, it is assumed that the user performs “IC card authentication” in accordance with the authentication execution screen shown in FIG. **5**, for example. In this case, the control device **30** causes the display of the display unit **22** to transition from the authentication execution screen to a “box selection screen” shown in FIG. **8**. On the box selection screen, a text or the like, an illustration, and virtual buttons **60** that can be tapped are displayed. An explanation text “Please select box from which luggage is to be taken out” is displayed in the upper part of the box selection screen. An illustration of a locker apparatus and an explanation of the coloring in the illustration are displayed in the middle part of the box selection screen. In the illustration of the locker apparatus, the numbers corresponding to the boxes **11** and **11a** in each of which the user has deposited luggage, and selection buttons **80** that can be selected to select these numbers are displayed. In this illustration, boxes with numbers corresponding to the respective boxes **11** and **11a** are the selection buttons **80**. In addition, a cancellation button **68** and a back button **70** are displayed in the lower part of the box selection screen.

[0063] If the user performs authentication with an IC card, there may be a plurality of target boxes. In this case, the target boxes are displayed in color (e.g., green or yellow) in the illustration of the locker apparatus on the box selection screen shown in FIG. **8**. For example, in FIG. **8**, if there are a plurality of target boxes, the corresponding boxes are displayed in color in the illustration of the locker apparatus (shown with diagonal lines or a grid in FIG. **8**). The user selects a box to be unlocked from among the colored boxes by tapping. If there is only one target box, the control device **30** skips the display of the box selection screen in FIG. **8**.

[0064] If the user taps a box to be unlocked from among the colored boxes on the box selection screen in FIG. **8** and this tap is “within 15 minutes” from deposit of luggage, the control device **30** causes the display of the display unit **22** to transition to a “take-out confirmation screen” shown in FIG. **9**. On the take-out confirmation screen, a text or the like, and a plurality of virtual buttons **60** that can be tapped are displayed. A text “Take-out confirmation” and an explanation text “This take-out is within 15 minutes from deposit. Please tap ‘Redeposit luggage’ if you wish to deposit luggage again, or please tap ‘Proceed with take-out as is’ if you wish to take out” are displayed in the upper part of the take-out confirmation screen. In addition, a luggage redeposit button **78** for instructing redeposit of luggage and a take-out button **79** for instructing take-out of luggage as is

are displayed in the middle part of the take-out confirmation screen. Furthermore, a cancellation button **68** is displayed in the lower part of the take-out confirmation screen. In this embodiment, this take-out confirmation screen is provided on the assumption that the user may intend to redeposit luggage but tap the take-out button **62** by mistake instead of the reopening door button **63**.

[0065] If the user selectively taps either one of the buttons **78** and **79** on the take-out confirmation screen, the control device **30** causes the display of the display unit **22** to transition to a “redeposit confirmation screen” shown in FIG. **10** or a “first warning screen” shown in FIG. **13**. However, even if take-out of luggage is “within 15 minutes”, if the luggage is to be taken out again, the redeposit confirmation screen and the box unlocking screen are not displayed.

[0066] If the user taps the luggage redeposit button **78** on the take-out confirmation screen, the control device **30** causes the display of the display unit **22** to transition to the “redeposit confirmation screen” shown in FIG. **10**. On the redeposit confirmation screen, a text or the like, and a plurality of virtual buttons **60** that can be tapped are displayed. An explanation text “You can redeposit luggage within 15 minutes after deposit”, and a small display **76** indicating the elapsed time from the deposit are displayed in the middle part of the redeposit confirmation screen. In addition, a cancellation button **68** and a confirmation button **69** are displayed in the lower part of the redeposit confirmation screen.

[0067] If the user taps the confirmation button **69**, the control device **30** causes the display of the display unit **22** to transition to a “box unlocking screen” shown in FIG. **11**. On the box unlocking screen, a text or the like, an illustration, and virtual buttons **60** that can be tapped are displayed. An explanation text “You can open the door” is displayed in the upper part of the box unlocking screen, and a text “Box number 0028” indicating a target box, and an illustration of a locker apparatus are displayed in the middle part of the same screen. In this case, the target box **81** with “0028” is colored (e.g., in green) and blinked in the illustration of the locker apparatus (shown with diagonal lines in FIG. **11**). In addition, an explanation text prompting an operation on the lever **14** after luggage is deposited again, and an illustration for the operation on the lever **14** are displayed in the lower part of the box unlocking screen. That is, an explanation text “Please lower lever after luggage is deposited again”, and an illustration for the operation on the lever **14** are displayed in the lower part of the box unlocking screen.

[0068] When this box unlocking screen is displayed, the control device **30** unlocks the locking device **13** of the target box **11** or **11a** in the actual locker apparatus **1**. The user opens the door **12** of this box **11** or **11a**, takes out luggage from the box **11** or **11a**, then closes the door **12**, and lowers the lever **14** to the closed side.

[0069] When the lever **14** is lowered to the closed side, the control device **30** causes the display of the display unit **22** to transition to an “end screen” shown in FIG. **12**. An explanation text “Thank you for using our service” is displayed in the middle part of the end screen. Then, the control device **30** returns the display of the display unit **22** to the standby screen shown in FIG. **3**.

[0070] Meanwhile, if the user taps the take-out button **79** on the take-out confirmation screen shown in FIG. **9**, the control device **30** causes the display of the display unit **22** to transition to the “first warning screen” shown in FIG. **13**. On the first warning screen, a text or the like, and virtual buttons **60** that can be tapped are displayed. An explanation text “Is it OK if use of this box is ended when you take out the luggage?” is displayed in the middle part of the first warning screen. In addition, a confirmation button **69** and a back button **70** are displayed in the lower part of the first warning screen.

[0071] If the user taps the confirmation button **69** on the first warning screen, the control device **30** causes the display of the display unit **22** to transition to a “second warning screen” shown in FIG. **14**. On the second warning screen, a text or the like, and virtual buttons **60** that can be tapped are displayed. An explanation text “Warning: If you tap ‘Confirm’, the luggage will be regarded as being taken out, and we will not be responsible for any loss of luggage. Is it really OK to proceed?”

is displayed in the middle part of the second warning screen. In addition, a confirmation button **69** and a back button **70** are displayed in the lower part of the second warning screen.

[0072] If the user taps the confirmation button **69** on the second warning screen shown in FIG. **14**, the control device **30** displays a “box unlocking screen” shown in FIG. **15** on the display unit **22**. On the box unlocking screen, a text or the like, and an illustration that can be tapped are displayed. An explanation text “You can open the door” is displayed in the upper part of the box unlocking screen. A text “Box number 0028” indicating a target box **81**, and an illustration of a locker apparatus are displayed in the middle part of the box unlocking screen. In this case, the target box **81** with “0028” is colored (e.g., in green) and blinked in the illustration of the locker apparatus on the box unlocking screen (shown with diagonal lines in FIG. **15**). In addition, an explanation text “Please take out luggage from box whose light is blinking” is displayed in the lower part of the box unlocking screen.

[0073] The box **81** blinking in the illustration of the locker apparatus displayed on the box unlocking screen shown in FIG. **15** corresponds to an example of a “luggage lamp” of the disclosed technique that operates to indicate whether or not there is luggage in the actual box **11** or **11a**. When this box unlocking screen is displayed, the control device **30** unlocks the locking device **13** in order to open the door **12** of the box **11** or **11a** in which luggage has been deposited, when the take-out button **62** is operated by the user, and the control device **30** maintains the unlocking of the locking device **13** when the door **12** is closed thereafter and it is determined that there is luggage in the box **11** or **11a** based on the detection result of the luggage sensor **40**. In addition, the control device **30** causes the corresponding box **81** (luggage lamp) in the illustration of the locker apparatus to flash while determining that there is luggage in the target box **11** or **11a** based on the detection result of the luggage sensor **40** after the take-out button **62** is operated by the user. On the other hand, the control device **30** performs control in which, if it is determined that there is no luggage in the box **11** or **11a** based on the detection result of the luggage sensor **40**, the corresponding box **81** in the illustration of the locker apparatus is not caused to flash, and the locking device **13** is locked when the door **12** of the corresponding box **11** is closed.

[0074] After the door **12** of the box **11** from which the user has taken out the luggage is locked, the control device **30** causes the display of the display unit **22** to transition to an “end screen” shown in FIG. **16**. An explanation text “Thank you for using our service. We look forward to the next time you use our service.” is displayed in the middle part of the end screen. Then, the control device **30** returns the display of the display unit **22** to the standby screen shown in FIG. **3**.

(Action and Effects of Locker Apparatus)

[0075] With the configuration of the locker apparatus **1** of this embodiment described above, in the operation of the above “luggage take-out mode”, when the take-out button **62** on the standby screen shown in FIG. **3** is operated by the user, the control device **30** unlocks the locking device **13** in order to open the door **12** of the box **11** or **11a** in which luggage has been deposited, and when the door **12** is closed thereafter and it is determined that there is luggage in the box **11** or **11a** based on the detection result of the luggage sensor **40**, the control device **30** maintains the unlocking of the locking device **13**.

[0076] Therefore, when a user takes out luggage from the box **11** or **11a** in which the user has deposited the luggage, even if a later user deposits luggage in the box **11** or **11a** by mistake and closes the door **12**, the locking device **13** is not locked. Thus, even if a later user tries to deposit luggage by mistake in the box **11** or **11a** from which a previous user took out luggage, the door **12** can be prevented from being locked. As a result, the later user can be prevented from depositing luggage in the box **11** or **11a** by mistake, so that security problems regarding deposited luggage can be avoided.

[0077] In the above case, the later user who has tried to deposit the luggage by mistake performs an operation for depositing the luggage in accordance with the transition screen of the display unit **22** at the operation unit **20**. However, since there is already luggage in the box **11** or **11a** that this user

is trying to use, the control device **30** cannot recognize this box **11** or **11a** as an empty box based on the detection result of the luggage sensor **40**, and does not permit the user to deposit the luggage in this box **11** or **11a**. In response to this, the later user selects a different empty box **11** or **11a** and deposits the luggage therein again.

[0078] With the configuration of this embodiment, in the operation of the above “luggage take-out mode”, the control device **30** is configured to display the box **81** in the illustration of the locker device on the box unlocking screen shown in FIG. **15** so as to flash while determining that there is luggage in the target box **11** or **11a** based on the detection result of the luggage sensor **40** after the take-out button **62** is operated by the user.

[0079] Therefore, even if a later user deposits luggage in this box **11** or **11a** by mistake, the mistaken deposit is notified to the later user. Thus, the later user can recognize the mistaken deposit of the luggage early and take action therefor.

[0080] With the configuration of this embodiment, in the operation of the above “luggage take-out mode”, the control device **30** records and manages the current statuses of the boxes **11** and **11a** that are in use and the boxes **11** and **11a** that are not in use, and also manages acceptance and recording of use reservations from the communication unit **50** for the boxes **11** and **11a** that are not in use. In addition, the control device **30** is configured to stop accepting a use reservation from the communication unit **50** for each box **11** or **11a** in which it is determined that there is luggage based on the detection result of the luggage sensor **40**.

[0081] With the above configuration, the control device **30** manages the use statuses of the boxes **11** and **11a** and also manages acceptance and recording of use reservations for the boxes **11** and **11a** that are not in use. Here, when a user takes out luggage from a box **11** or **11a** in which the user has deposited the luggage, this box **11** or **11a** appears to be empty once. However, the control device **30** stops accepting a use reservation for each box **11** or **11a** in which it is determined that there is luggage based on the detection result of the luggage sensor **40**. Therefore, when a user takes out luggage from a box **11** or **11a**, even if a later user deposits luggage in this box **11** or **11a** by mistake and another user tries to make a use reservation for this box **11** or **11a** at the same time, the reservation is not accepted. Thus, even if the later user deposits the luggage by mistake in the box **11** or **11a** from which the previous user took out the luggage, still another user can be prevented from making a use reservation for this box **11** or **11a**. As a result, even if the later user leaves the luggage in the box **11** or **11a** as it is, a situation in which another user who has made a reservation opens the door **12** of this box **11** or **11a** can be avoided, so that security problems regarding left luggage can be avoided.

[0082] With the configuration of this embodiment, as for the transition screens when the “luggage take-out mode” is executed, the “first warning screen” shown in FIG. **13** and the “second warning screen” shown in FIG. **14** are provided between the end screen shown in FIG. **12** and the box unlocking screen shown in FIG. **15**, so that it is possible to cope with a mistake in operating the virtual button **60** on the take-out confirmation screen shown in FIG. **9**. That is, if the user intends to operate the luggage redeposit button **78** but operates the take-out button **79** by mistake on the take-out confirmation screen shown in FIG. **9**, the use of the box **11** or **11a** can be prevented from being terminated against the user's intention.

Second Embodiment

[0083] Next, a second embodiment will be described. In the following description, the components that are equivalent to those of the first embodiment are designated by the same reference characters, the description thereof is omitted, and the differences will be mainly described.

[0084] This embodiment is different from the first embodiment in the content of the transition screen displayed on the display unit **22** when the “luggage take-out mode” is executed. That is, in the first embodiment, the “first warning screen” shown in FIG. **13** and the “second warning screen” shown in FIG. **14** are provided between the end screen shown in FIG. **12** and the box unlocking screen shown in FIG. **15**. In contrast, in this embodiment, the “first warning screen” shown in FIG.

13 and the “second warning screen” shown in FIG. **14** are deleted from the series of transition screens shown in FIG. **3** to FIG. **16**, and instead, a “warning screen” shown in FIG. **17** is provided between the “box selection screen” shown in FIG. **8** and the “take-out confirmation screen” shown in FIG. **9**.

[0085] On the warning screen shown in FIG. **17**, a text or the like and virtual buttons **60** that can be tapped are displayed. An explanation text “Warning: If you take out the luggage as is, the luggage will be regarded as being taken out. If luggage is left as is, the luggage may be stolen by a third person. Is it really OK to proceed?” is displayed in the middle part of the warning screen. In addition, a confirmation button **69** and a back button **70** are displayed in the lower part of the warning screen.

[0086] With the configuration of this embodiment, unlike the first embodiment, as for the transition screens when the “luggage take-out mode” is executed, the “first warning screen” shown in FIG. **13** and the “second warning screen” shown in FIG. **14** are deleted from the series of transition screens, and instead, the “warning screen” shown in FIG. **17** is provided between the “box selection screen” shown in FIG. **8** and the “take-out confirmation screen” shown in FIG. **9**, so that a mistake in operation between the luggage redeposit button **78** and the take-out button **79** on the take-out confirmation screen shown in FIG. **9** can be prevented.

OTHER EMBODIMENTS

[0087] The disclosed technique is not limited to the above embodiments, and can also be implemented by changing part of the components as appropriate without departing from the scope of the gist of the disclosed technique.

[0088] (1) In the above embodiments, for the locker apparatus **1**, it is assumed that the user who deposits luggage and the user who takes out luggage are the same person. In contrast, it is also possible to assume that the user who deposits luggage and the user who takes out luggage are different persons. More specifically, in recent years, the idea of using railroad stations as logistics bases has become more widespread, so that it is conceivable that the user who deposits luggage is a transport business operator who delivers commodities ordered by a general consumer, and the user who takes out luggage is the general consumer who had ordered the commodities. In this case, for example, a specific transport business operator is allowed to use the locker apparatus **1**, and after the transport business operator is authenticated using the operation unit **20**, the deposit program **32a** is activated. For authentication in taking out luggage, for example, a private code for authentication such as a QR code (registered trademark) for authentication may be transmitted to a mobile terminal or the like of the general consumer, and after the private code is authenticated, the take-out program **32b** may be activated.

[0089] (2) In the above embodiments, the box **81** in the illustration of the locker apparatus displayed on the box unlocking screen shown in FIG. **15** is an example of the “luggage lamp”. In contrast, for example, a dedicated lamp as the “luggage lamp” may also be provided in the operation unit **20** shown in FIG. **1**.

[0090] (3) In the above embodiments, as an example, the disclosed technique is embodied in the locker apparatus **1** installed on the premises of a station, but is not limited thereto, and, for example, a home delivery box installed in a housing complex or the like may be adopted.

[0091] The disclosed technique can be used, for example, for a locker apparatus installed on the premises of a station.

REFERENCE SIGNS LIST

[0092] **1** Locker apparatus [0093] **11** Box [0094] **11a** Small box [0095] **12** Door [0096] **13** Locking device [0097] **20** Operation unit [0098] **30** Control device [0099] **40** Luggage sensor [0100] **50** Communication unit (reservation acceptance member) [0101] **62** Take-out button [0102] **81** Box in an illustration of a locker apparatus (luggage lamp)

Claims

1. A locker apparatus comprising: a box capable of accommodating luggage therein; a door configured to open and close the box; a locking device configured to unlockably lock the door; an operation unit configured to receive an operation by a user; and a control device configured to control the locking device in response to an operation on the operation unit by the user, wherein the control device is configured to lock the locking device in order to lock the door into a closed state except when the luggage is deposited in the box and when the luggage is taken out from the box, the box is provided with a luggage sensor for detecting luggage in the box, the operation unit includes a take-out button that is operated by the user in order to take out the luggage from the box in which the user has deposited the luggage, and when the take-out button is operated by the user, the control device unlocks the locking device in order to open the door of the box in which the luggage has been deposited, and when the door is closed thereafter and it is determined that there is the luggage in the box based on a detection result of the luggage sensor, the control device maintains unlocking of the locking device.
 2. The locker apparatus according to claim 1, further comprising a luggage lamp configured to operate in order to indicate whether or not there is the luggage in the box, wherein the control device causes the luggage lamp to light up or flash while determining that there is the luggage in the box as a target based on the detection result of the luggage sensor after the take-out button is operated by the user.
 3. The locker apparatus according to claim 1, further comprising reservation acceptance member configured to accept a use reservation for the box, wherein the control device is configured to record and manage a current status of each box that is in use and each box that is not in use, and to manage acceptance and recording of a use reservation from the reservation acceptance member for each box that is not in use, and the control device stops accepting a use reservation from the reservation acceptance member for the box in which it is determined that there is the luggage based on the detection result of the luggage sensor.
 4. The locker apparatus according to claim 2, further comprising reservation acceptance member configured to accept a use reservation for the box, wherein the control device is configured to record and manage a current status of each box that is in use and each box that is not in use, and to manage acceptance and recording of a use reservation from the reservation acceptance member for each box that is not in use, and the control device stops accepting a use reservation from the reservation acceptance member for the box in which it is determined that there is the luggage based on the detection result of the luggage sensor.
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