(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 845 053 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
17.10.2007 Bulletin 2007/42

(21) Application number: **05703281.5**

(22) Date of filing: **04.01.2005**

(51) Int Cl.:
B66B 13/16 *(2006.01)*

(86) International application number:
PCT/JP2005/000003

(87) International publication number:
WO 2006/072974 (13.07.2006 Gazette 2006/28)

(84) Designated Contracting States:
NL

(71) Applicant: **MITSUBISHI DENKI KABUSHIKI KAISHA**
Chiyoda-ku, Tokyo 100-8310 (JP)

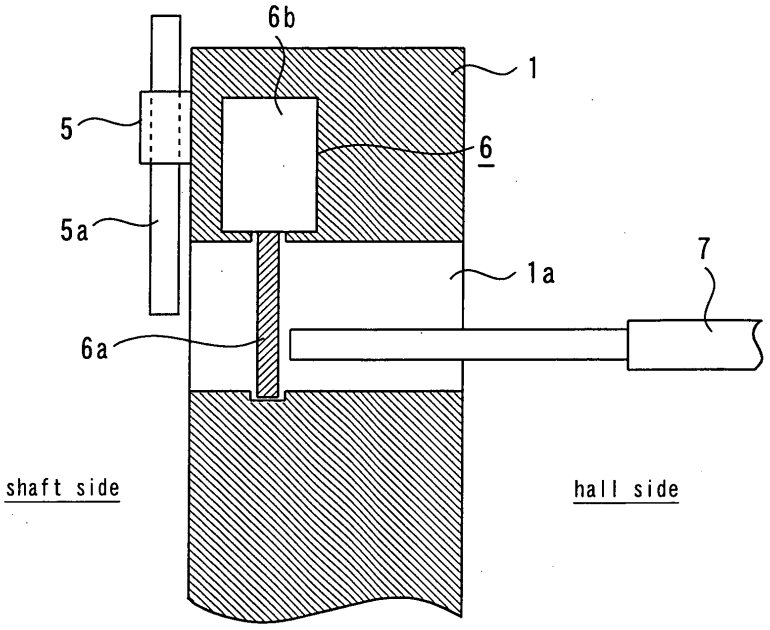
(72) Inventor: **FUJIKI, Takeshi**
Chiyoda-ku
Tokyo 1008310 (JP)

(74) Representative: **HOFFMANN EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) LANDING DOOR DEVICE OF ELEVATOR

(57) There is provided an elevator hatch door apparatus capable of preventing a locking device for a hatch door surely and easily from being unlocked by a person other than an authorized person. For this purpose, the elevator hatch door apparatus comprises a locking device for locking an elevator hatch door; an unlocking device for unlocking the locking device; an authentication device for authenticating an authorized person who is authorized to unlock the locking device; and an unlocking limiter for enabling the unlocking operation of the unlocking device based on the authentication result of the authentication device. In the case where it is confirmed by the authentication device that the authenticated person is the authorized person registered in advance, the unlocking operation limitation of the unlocking device imposed by the unlocking limiter is removed. In the case where it is not confirmed by the authentication device that the authenticated person is the authorized person, the unlocking operation limitation of the unlocking device imposed by the unlocking limiter is maintained.

Fig.2



EP 1 845 053 A1

Description

Technical Field

[0001] The present invention relates to a hatch door apparatus provided on an elevator hall.

Background Art

[0002] An elevator door is made up of a hatch door for closing a hall entrance on an elevator hall of a building and a car door for closing a car entrance moving up and down in an elevator shaft. The opening/closing operation for both of these doors is generally performed by a door operator provided on the car. Specifically, when the elevator car stops at an elevator hall on a predetermined floor, a door clutch provided on the car door and the hatch door engage each other, and thus the driving force of the door operator is transmitted to the hatch door via the car door. That is to say, the hatch door is opened and closed in association with the car door. The hatch door on an elevator hall at which the car is not stopping is always closed, and is further locked by a locking device from the elevator shaft side to prevent the hatch door from being opened inadvertently at the time of being closed.

[0003] The hatch door is provided with an unlocking device for unlocking the locking device from the hall side to make provision for the periodical maintenance and inspection of elevator or the rescue operation in emergency. Figure 6 is a sectional view showing an essential portion of a conventional elevator hatch door apparatus. In Figure 6, on the side surface on the shaft side of a hatch door 1, an unlocking device 5 for unlocking a locking device 4 for the hatch door 1 is provided. This unlocking device 5 is provided with an operating portion 5a so that the locking device 4 is unlocked, for example, by moving this operating portion 5a to one side. Also, at an upper part of the hatch door 1, an unlocking hole 1a penetrating from the elevator hall side to the shaft side is formed. This unlocking hole 1a is arranged so as to be located at almost the same position as the lower end portion of the operating portion 5a of the unlocking device 5 at the opening of the hall side. Therefore, when the hatch door 1 must be opened, for example, at the time of maintenance, a maintenance worker dispatched from an elevator maintenance company inserts a special-purpose key 7 in the unlocking hole 1a from the elevator hall side to move the operating portion 5a of the unlocking device 5 to one side by using this special-purpose key 7, thereby unlocking the locking device 4 for the hatch door 1. Conventionally, by forming the unlocking hole 1a in the hatch door 1 and the special-purpose key 7 into a special shape such that the unlocking hole 1a and the special-purpose key 7 engage each other, or by arranging the unlocking hole 1a at a place invisible from the ordinary users, efforts have been made to prevent the locking device 4 from being unlocked mischievously.

[0004] Also, as a conventional art for the hatch door apparatus, a technique has been proposed in which after a closing plate has been turned by using a special-purpose key inserted in a second keyhole, an unlocking operation is performed by using a special-purpose key inserted in a first keyhole, by which the hatch door can be unlocked (for example, refer to Patent Document 1).

[0005] Also, as another conventional art, a technique has been proposed in which an unlocking device for unlocking a locking device for a hatch door is provided, and when predetermined conditions are met, an unlocking signal is sent to the unlocking device, by which the locking device is unlocked electrically (for example, refer to Patent Document 2).

Patent Document 1: Japanese Patent Laid-Open No. 11-222373
Patent Document 2: Japanese Patent Laid-Open No. 8-59151

Disclosure of the Invention

Problems to be Solved by the Invention

[0006] In the conventional hatch door apparatus shown in Figure 6, it is difficult to completely prevent the operation of the unlocking device 5 from being performed by a person other than a person permitted to unlock the locking device 4 (a third person). Specifically, there has been a fear that the locking device 4 is unlocked mischievously by the third person by inserting a member having a shape similar to that of the special-purpose key 7 in the unlocking hole 1a or by knowing the unlocking method by looking at the unlocking operation performed by the maintenance worker.

[0007] Also, in the technique described in Patent Document 1, by complicating the procedure for unlocking operation, it is intended to make the third person recognize the danger of opening the hatch door. However, in the case where the procedure for unlocking operation is found by the third person, the locking device cannot be prevented from being unlocked mischievously.

[0008] Also, in the technique described in Patent Document 2, no special-purpose key is needed because the locking device is unlocked electrically. However, it is difficult to quickly open the hatch door on an arbitrary floor because the locking device can be unlocked only when the conditions such as the ON/OFF state of a manual switch provided in the car or a machine room, the position of the car and the ON/OFF state of a hall button on a predetermined floor are met.

[0009] The present invention has been made to solve the above problems, and accordingly an object thereof is to provide an elevator hatch door apparatus capable of preventing a locking device for a hatch door surely and easily from being unlocked by a person other than an authorized person.

Means for Solving the Problems

[0010] An elevator hatch door apparatus related to the present invention comprises a hatch door provided on an elevator hall; a locking device for locking the hatch door; an unlocking device for unlocking the locking device; an authentication device for authenticating an authorized person who is authorized to unlock the locking device; and an unlocking limiter for enabling an unlocking operation of the unlocking device based on an authentication result of the authentication device.

Effect of the Invention

[0011] The present invention is configured by comprising a hatch door provided on an elevator hall; a locking device for locking the hatch door; an unlocking device for unlocking the locking device; an authentication device for authenticating an authorized person who is authorized to unlock the locking device; and an unlocking limiter for enabling an unlocking operation of the unlocking device based on an authentication result of the authentication device. Therefore, the locking device for the hatch door can be prevented surely and easily from being unlocked by a person other than the authorized person.

Brief Description of the Drawings

[0012]

Figure 1 is a front view of an elevator hatch door apparatus in embodiment 1 of the present invention.
Figure 2 is a sectional view of an essential portion of the elevator hatch door apparatus in embodiment 1 of the present invention.
Figure 3 is a flowchart showing the operation of the unlocking limiter in embodiment 1 of the present invention.
Figure 4 is a diagram to explain the operation of the unlocking limiter in embodiment 1 of the present invention.
Figure 5 is a flowchart showing the operation of the unlocking device in embodiment 1 of the present invention.
Figure 6 is a sectional view showing an essential portion of a conventional elevator hatch door apparatus.

Description of Symbols

[0013] 1 hatch door, 1a unlocking hole, 2 hanger roller, 3 hanger rail, 4 locking device, 4a first hook portion, 4b second hook portion, 5 unlocking device, 5a operating portion, 6 unlocking limiter, 6a shield plate, 6b solenoid, 7 special-purpose key

Best Mode for Carrying Out the Invention

[0014] To describe the present invention in more detail, the present invention will be explained with reference to the accompanying drawings. In each drawing, the same symbols are applied to the same or corresponding elements, and the duplicated explanation thereof is simplified or omitted appropriately.

Embodiment 1

[0015] Figure 1 is a front view of an elevator hatch door apparatus in embodiment 1 of the present invention, showing a state in which the hatch door apparatus is viewed from the elevator shaft side. In Figure 1, on an elevator hall provided on each floor of a building, a hatch door 1 for closing a hall entrance is provided. As described before, the opening/closing operation of the hatch door 1 is generally performed by a door operator (not shown) provided on an elevator car (not shown). The hatch door 1 is configured so that the opening/closing direction thereof is guided by rolling of hanger rollers 2 provided rotatably above the hatch door 1 on a hanger rail 3 provided on a shaft wall above the hall entrance.

[0016] Also, the hatch door 1 on the elevator hall at which the car is not stopping is always closed, and is further locked by a locking device 4 provided on the shaft side to prevent the hatch door 1 from being opened inadvertently when the hatch door 1 is being closed. The locking device 4 includes a first hook portion 4a fixed on the shaft wall above the hall entrance and a second hook portion 4b engaging with the first hook portion 4a when the hatch door 1 is being closed.

[0017] On the side surface on the shaft side of the hatch door 1 on a predetermined floor, an unlocking device 5 is provided to unlock the locking device 4 by a predetermined operation or input from the elevator hall side when the hatch door 1 must be opened, for example, at the time of elevator maintenance. The unlocking device 5 shown in Figure 1 is provided with an operating portion 5a below the second hook portion 4b of the locking device 4, and is configured so that the locking device 4 is unlocked by performing a predetermined operation of the operating portion 5a. Therefore, in the case where the hatch door 1 must be opened, a person authorized to unlock the locking device 4 (an authorized person) inserts a special-purpose key into an unlocking hole 1a formed in the hatch door 1 from the elevator hall side, and operates the operating portion 5a of the unlocking device 5 by using the special-purpose key to unlock the locking device 4.

[0018] Figure 2 is a sectional view of an essential portion of the elevator hatch door apparatus in embodiment 1 of the present invention. The personal information of the authorized persons such as maintenance workers at the elevator maintenance company or caretakers for the building in which the elevator is provided is registered in an authentication device (not shown) in advance. Refer-

ence numeral 6 denotes an unlocking limiter that enables the unlocking operation of the unlocking device 5 only when it is confirmed, based on the authentication result of the authentication device, that the authenticated person is the authorized person. This unlocking limiter 6 is made up of a shield plate 6a for closing the unlocking hole 1a formed in the hatch door 1 and a solenoid 6b for opening and closing the unlocking hole 1a by moving the shield plate 6a vertically based on the authentication result of the authentication device. The authentication device consists of a fingerprint identification system or an ID card reader provided additionally on the elevator apparatus, an authentication system for a password transmitted from a personal terminal such as a cellular phone, or the like. Also, in the case where the elevator is provided in an apartment house etc., the function of authentication device may be provided additionally in the building maintenance system of the apartment house etc. For example, as the authentication device, an authentication system for unlocking an automatic security lock system for a common entrance door can also be used.

[0019] In embodiment 1, the unlocking limiter 6 made up of the shield plate 6a and the solenoid 6b is shown. However, the unlocking limiter 6 is not limited to this configuration if it has a function of enabling and disabling the unlocking operation of the unlocking device 5 based on the authentication result of the authentication device, namely, a function of removing or maintaining the unlocking operation limitation of the unlocking device 5 based on the authentication result of the authentication device. That is to say, the unlocking limiter 6 has only to have the configurations of the locking device 4 and the unlocking device 5 of the hatch door apparatus and have the configuration and operation matching the unlocking method of the unlocking device 5. For example, in the case where the unlocking device 5 has the above-described configuration, the configuration may be such that a braking device for braking the operating portion 5a of the unlocking device 5 is provided as the unlocking limiter 6, and only when it is confirmed by the authentication device that the authenticated person is the authorized person, the braking device is released, by which the unlocking operation of the unlocking device 5 is enabled, namely, the unlocking operation limitation of the unlocking device 5 is removed. The locking device 4 and the unlocking device 5 are also not limited to the above-described configurations, and the unlocking hole 1a need not necessarily be formed in the hatch door 1.

[0020] Next, the operation of the unlocking limiter 6 is explained.

[0021] Figure 3 is a flowchart showing the operation of the unlocking limiter 6 in embodiment 1 of the present invention. When the maintenance worker at the elevator maintenance company opens the hatch door 1, for example, at the time of periodic maintenance, this maintenance worker is first authenticated to confirm that the maintenance worker is the authorized person by using the authentication device provided additionally on the elevator apparatus (Step S301). In the case where it is not confirmed by the authentication device that the authenticated person (herein, the maintenance worker) is the authorized person (Step S302), the unlocking operation of the unlocking device 5 is not permitted (Step S303), and the unlocking operation limitation of the unlocking device 5 imposed by the unlocking limiter 6 is maintained. Therefore, the locking device 4 cannot be unlocked by the unlocking device 5 (Step S304). Concretely, as shown in Figure 2, the state in which the unlocking hole 1a in the hatch door 1 is closed by the shield plate 6a is maintained, so that even if a special-purpose key 7 is inserted into the unlocking hole 1a from the elevator hall side, the unlocking operation of the unlocking device 5 cannot be performed. On the other hand, in the case where it is confirmed by the authentication device that the authenticated person is the authorized person (Step S305), the unlocking operation of the unlocking device 5 is permitted (Step S306), and the unlocking operation limitation of the unlocking device 5 imposed by the unlocking limiter 6 is removed. Therefore, by performing a predetermined operation or input on the unlocking device 5, the locking device 4 can be unlocked (Step S307). Concretely, as shown in Figure 4, the shield plate 6a is moved upward by the solenoid 6b, so that the unlocking operation of the unlocking device 5 can be performed by inserting the special-purpose key 7 into the unlocking hole 1a from the elevator hall side.

[0022] Herein, in the case where it is confirmed by the authentication device that the authenticated person is the authorized person, it is possible to enable the unlocking operation of the unlocking device 5 by imposing time limitation, and to disable the unlocking operation after predetermined time has elapsed after the authentication using the authentication device. That is to say, after the predetermined time has elapsed, the unlocking operation of the unlocking device 5 is limited by the unlocking limiter 6, by which the subsequent unlocking operation is prevented from being performed by the third person. Concretely, the shield plate 6a having been moved upward by the solenoid 6b at the time of authentication of the authorized person is moved downward to close the unlocking hole 1a after the predetermined time has elapsed.

[0023] Even if the configuration is made such that a means for detecting the completion of the unlocking operation of the unlocking device 5 is provided, and in the case where the completion of the unlocking operation of the unlocking device 5 is detected after the authentication of the authorized person, the unlocking operation of the unlocking device 5 is limited by the unlocking limiter 6, the same effect as that in the case where the time limitation is imposed can be achieved.

[0024] Also, in the case where the authentication device and the unlocking device 5 are provided at places distant from each other, for example, in the case where the function of the authentication device is provided additionally in the building maintenance system, predetermined time is required from when the authenticated per-

son receives authentication of the authorized person to when the authenticated person performs the unlocking operation of the unlocking device 5. In such a case, to prevent the unlocking operation of the unlocking device 5 from being performed by the third person within the predetermined time, time limitation may be imposed such that the unlocking operation of the unlocking device 5 is first enabled after predetermined time based on the distance between the installation position of the authentication device and the installation position of the unlocking device 5 or the movement from the installation position of the authentication device to the installation position of the unlocking device 5 has elapsed after the authentication using the authentication device. At this time, the state in which the unlocking operation of the unlocking device 5 is limited by the unlocking limiter 6 after the authentication using the authentication device is set so as to be slightly longer than the time necessary for the movement from the authentication device to the unlocking device 5, by which the unlocking operation of the unlocking device 5 can surely prevented from being performed by the third person during the time when the authorized person arrives at the installation place of the unlocking device 5.

[0025] To surely prevent a mischievous unlocking operation from being performed by the third person, a sensor may be provided to detect an unlocking operation intended to unlock the locking device 4 performed when authentication is not given by the authentication device, namely, when the unlocking operation of the unlocking device 5 is limited by the unlocking limiter 6. This sensor is configured so as to detect not only the fact that the unlocking operation of the unlocking device 5 has been performed actually but also the operation intended to unlock the locking device 4. Concretely, a force acting on the shield plate 6a is measured by the sensor, and if a force higher than a predetermined value acts on the shield plate 6a, the force is detected as the unlocking operation intended to unlock the locking device 4.

[0026] In the case where the above-described sensor is provided, a reporting device is provided to report the detection result obtained by the sensor to the outside such as an elevator remote control system or the building maintenance system, by which a mischievous unlocking operation performed by the third person can be monitored at any time. Also, in the case where an unlocking operation intended to unlock the locking device 4 is detected by the sensor, an alarm may be given to that elevator hall.

[0027] Also, the control of authorized person can be carried out easily by providing a recorder for recording the authentication history of authorized person authenticated by the authentication device. In the case where the recorder is provided, a transmitter may be provided to transmit the authentication history recorded by the recorder to the outside such as an elevator remote monitoring system or the building maintenance system.

[0028] According to embodiment 1 of the present invention, only an authenticated person authenticated as the authorized person by the authentication device can perform the unlocking operation of the unlocking device 5. Therefore, the locking device 4 can be prevented surely and easily from being unlocked by the third person.

[0029] To make provision for the case where the authentication device for authenticating the authorized person does not operate normally, for example, as shown in Figure 5, a releasing device for removing the unlocking operation limitation of the unlocking device 5 imposed by the unlocking limiter 6 regardless of the authentication result of the authentication device may be provided in a maintenance space such as a control panel in the machine room or a control panel mounted in the car. Also, in the case where the function of authentication device is provided additionally in the building maintenance system, the function of the above-described releasing device may be provided in the building maintenance system like the authentication device.

Industrial Applicability

[0030] As described above, according to the elevator hatch door apparatus in accordance with the present invention, unless an authenticated person is confirmed as an authorized person registered in advance, the unlocking device cannot be operated. Therefore, the locking device can surely be prevented from being unlocked by the third person, so that a safer elevator hatch door apparatus can be provided.

Claims

1. An elevator hatch door apparatus, comprising:

a hatch door 1 provided on an elevator hall;
a locking device 4 for locking the hatch door 1;
an unlocking device 5 for unlocking the locking device 4;
an authentication device for authenticating an authorized person who is authorized to unlock the locking device 5; and
an unlocking limiter 6 for enabling an unlocking operation of the unlocking device 5 based on an authentication result of the authentication device.

2. An elevator hatch door apparatus, comprising:

a hatch door 1 provided on an elevator hall;
a locking device 4 for locking the hatch door 1;
an unlocking device 5 for unlocking the locking device 4;
an authentication device for authenticating an authorized person who is authorized to unlock the locking device 5;
an unlocking limiter 6 for enabling an unlocking operation of the unlocking device 5 based on an

authentication result of the authentication device; and

a sensor for detecting an unlocking operation having been performed when the unlocking operation of the unlocking device 5 is limited by the unlocking limiter 6.

3. The elevator hatch door apparatus according to claim 2, further comprising:

a reporting device for reporting a detection result obtained by the sensor to the outside.

4. An elevator hatch door apparatus, comprising:

a hatch door 1 provided on an elevator hall;
a locking device 4 for locking the hatch door 1;
an unlocking device 5 for unlocking the locking device 4;
an authentication device for authenticating an authorized person who is authorized to unlock the locking device 5;
an unlocking limiter 6 for enabling an unlocking operation of the unlocking device 5 based on an authentication result of the authentication device; and
a releasing device for removing an unlocking operation limitation of the unlocking device 5 imposed by the unlocking limiter 6 regardless of an authentication result of the authentication device.

5. The elevator hatch door apparatus according to any one of claims 1 to 4, **characterized in that** the unlocking limiter 6 enables the unlocking operation of the unlocking device 5 by imposing time limitation.

6. The elevator hatch door apparatus according to claim 5, **characterized in that** the unlocking limiter 6 enables the unlocking operation of the unlocking device 5 after predetermined time based on an installation position of the authentication device and an installation position of the unlocking device 5 has elapsed after authentication of the authorized person using the authentication device.

7. The elevator hatch door apparatus according to any one of claims 1 to 6, further comprising:

a recorder for recording an authentication history of authorized person authenticated by the authentication device.

8. The elevator hatch door apparatus according to claim 7, further comprising:

a transmitter for transmitting the authentication history of authorized person recorded by the recorder to the outside.

9. The elevator hatch door apparatus according to any one of claims 1 to 8, **characterized in that** the authentication device is provided additionally in a building maintenance system.

Fig.1

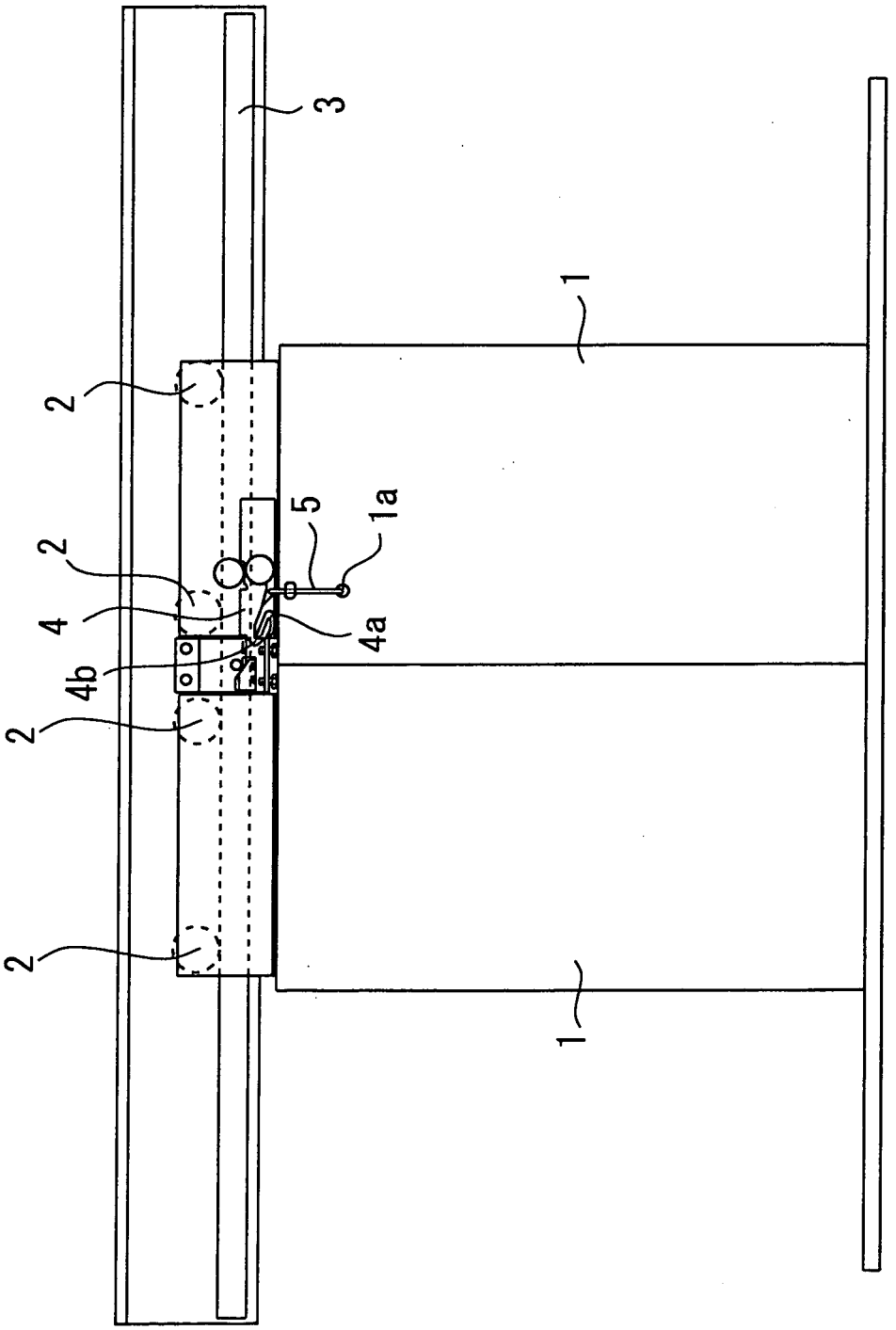


Fig.2

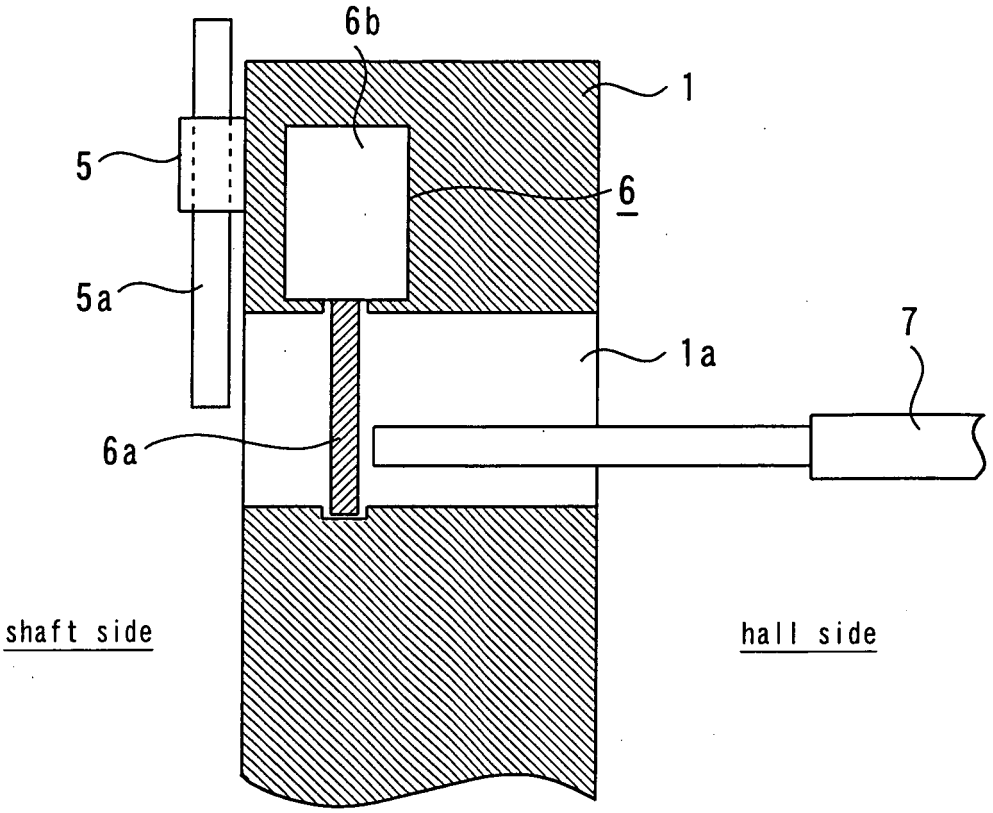

6b
1
5
6
5a
1a
7
6a
shaft side
hall side

Fig.3

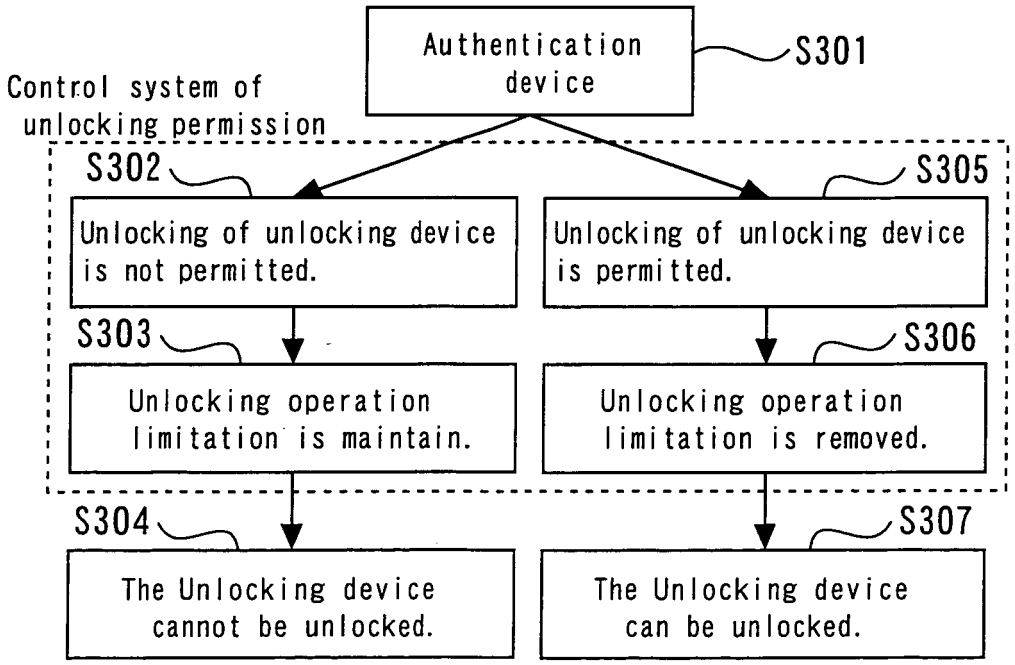

Authentication device
S301
Control system of unlocking permission
S302
S305
Unlocking of unlocking device is not permitted.
Unlocking of unlocking device is permitted.
S303
S306
Unlocking operation limitation is maintain.
Unlocking operation limitation is removed.
S304
S307
The Unlocking device cannot be unlocked.
The Unlocking device can be unlocked.

Fig.4

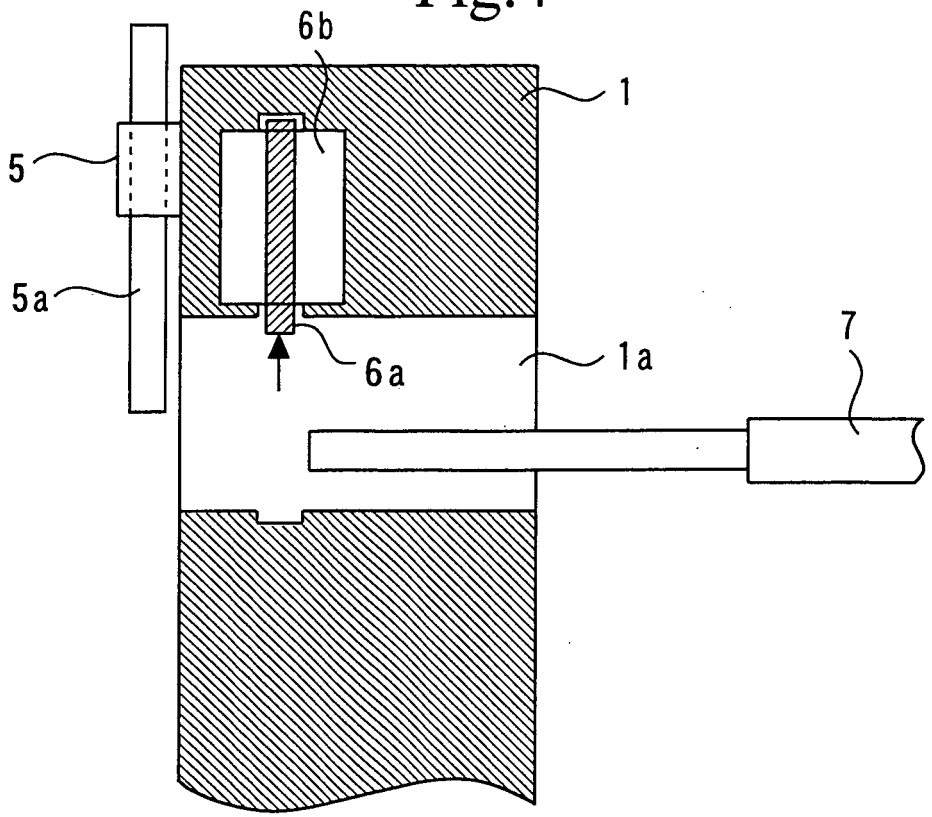

6b
1
5
5a
6a
1a
7

Fig.5

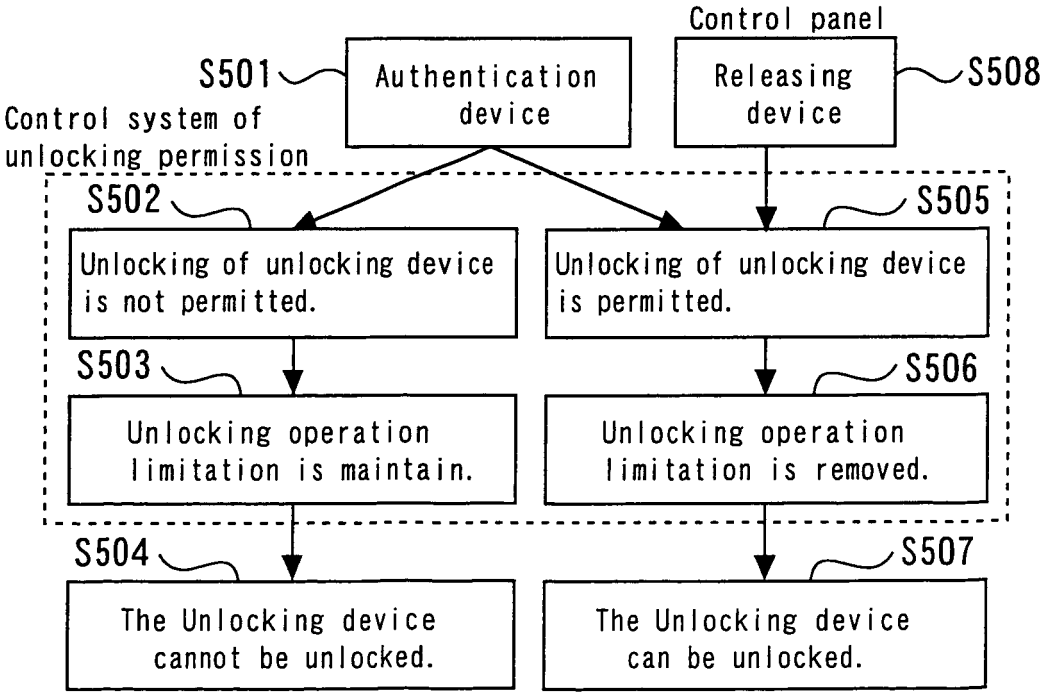
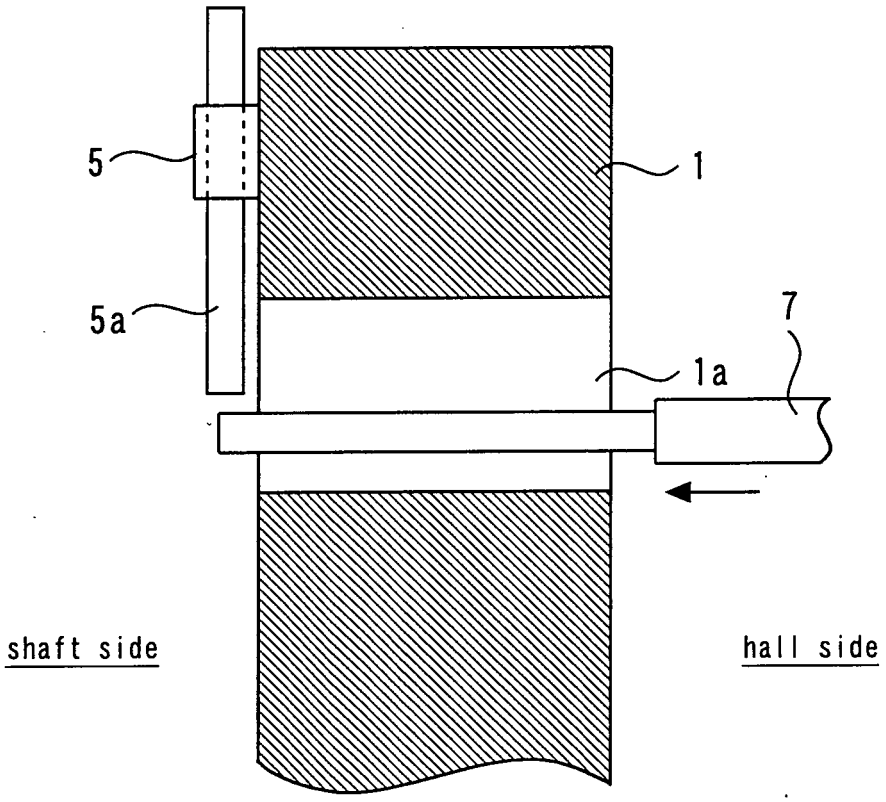

Control panel
S501
Authentication device
Releasing device
S508
Control system of unlocking permission
S502
S505
Unlocking of unlocking device is not permitted.
Unlocking of unlocking device is permitted.
S503
S506
Unlocking operation limitation is maintain.
Unlocking operation limitation is removed.
S504
S507
The Unlocking device cannot be unlocked.
The Unlocking device can be unlocked.

Fig.6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/000003

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B13/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] B66B13/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2005
Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2004-338944 A (Inventio AG.), 02 December, 2004 (02.12.04), Par. Nos. [0016] to [0031]; Figs. 1 to 7 & ZA 200401267 A & CA 2459447 A1 & PL 365871 A1 & CN 1526633 A & US 2004/0173415 A1 & AU 2004200881 A1 & EP 1471028 A1 & BR 0400331 A	1,4-9 2-3
Y A	JP 10-246043 A (Yunitekku Kabushiki Kaisha), 14 September, 1998 (14.09.98), Abstract; Claims; Par. No. [0087]; Fig. 3(c) (Family: none)	1,4-9 2-3

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 September, 2005 (28.09.05)	18 October, 2005 (18.10.05)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/000003

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 8-59151 A (Mitsubishi Electric Building Techno-Service Co., Ltd.), 05 March, 1996 (05.03.96), Par. Nos. [0016] to [0027]; Figs. 1 to 3 (Family: none)	5-6
A	JP 9-52685 A (Mitsubishi Electric Building Techno-Service Co., Ltd.), 25 February, 1997 (25.02.97), Claims (Family: none)	1
A	JP 61-238688 A (Mitsubishi Electric Corp.), 23 October, 1986 (23.10.86), Claims (Family: none)	1
A	JP 53-71441 A (Mitsubishi Electric Corp.), 24 June, 1978 (24.06.78), Claims (Family: none)	1

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 11222373 A **[0005]**
- JP 8059151 A **[0005]**