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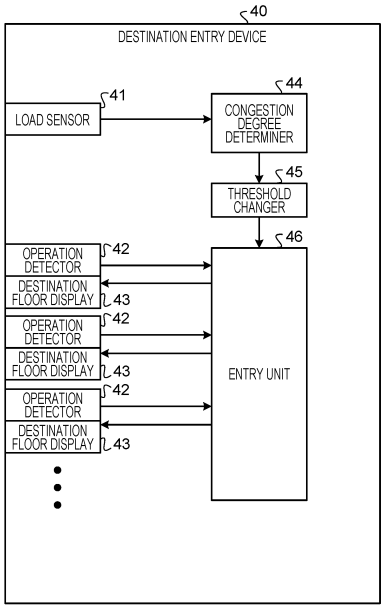
(54) **DESTINATION REGISTRATION DEVICE AND DESTINATION REGISTRATION METHOD**

(57) The destination entry device 40 that receives operation by a passenger of an elevator and enters a destination floor includes: the congestion degree determiner 44 as a determiner that determines a congestion degree of a car of the elevator; the operation detector 42 that contactlessly detects an operation of designating the destination floor; the threshold changer 45 that changes a threshold related to a distance in accordance with the congestion degree regarding the contactless detection; and the entry unit 46 that enters the destination floor when a detection result that satisfies the threshold related to the distance is obtained. Such configuration and operation make it possible to perform separated destination entry operation while preventing erroneous operation.

FIG. 3



EP 4 219 372 A1

Description

Technical Field

[0001] The present invention relates to management of a destination entry device and a destination entry method.

Background Art

[0002] There is a technique described in JP 2015-151253 A (PTL 1) for receiving a non-contact operation by a passenger of an elevator and enter a destination floor. This publication describes that "An operation panel device of an elevator according to this invention comprises: operation buttons provided in an operation panel that is installed in a landing hall of the elevator or a car; sensors for contactlessly detecting the presence or absence of an object on linear detection axes respectively, in which a predetermined number of two or more sensors are provided to correspond to each operation button; and a determination unit for determining whether the operation button is in an operation detection state when the predetermined number of sensors corresponding to one operation button detect the object on the detection axes simultaneously. The detection axes of the predetermined number of sensors corresponding to one operation button are arranged so as to cross each other at one point on a space which is the inside of an operation surface part of the operation button in a front view.".

Citation List

Patent Literature

[0003] PTL 1: JP 2015-151253 A

Summary of Invention

Technical Problem

[0004] PTL 1 adopts a configuration in which operation is detected at one point where detection axes intersect, and a distance from the operation panel to a point where the operation detection is established is fixed. The distance in this case is set in the vicinity of the operation panel in order to prevent erroneous operation, and contact with the operation panel is also permitted. However, in recent years, from the viewpoint of countermeasures against infectious diseases, it is required to establish destination entry operation at a position sufficiently away from the operation panel surface in order to reduce the risk due to contact, and it is necessary to suppress erroneous operation also at that time.

[0005] Therefore, an object of the present invention is to provide a technology capable of performing separated destination entry operation while preventing erroneous operation.

Solution to Problem

[0006] In order to solve the above problems, one of a destination entry device and a destination entry method of the present invention that are representative is that a destination entry device that receives operation by a passenger of an elevator and enters a destination floor determines a congestion degree of a car of the elevator, contactlessly detects an operation of designating the destination floor, changes a threshold related to a distance in accordance with the congestion degree regarding the contactless detection, and enters the destination floor when a detection result that satisfies the threshold related to the distance is obtained.

Advantageous Effects of Invention

[0007] According to the present invention, it is possible to perform separated destination entry operation while preventing erroneous operation.

[0008] Problems, configurations, and effects other than those described above will be made clear by the description of the following embodiment.

Brief Description of Drawings

[0009]

[FIG. 1] FIG. 1 is an explanatory view for destination entry in an embodiment.
[FIG. 2] FIG. 2 is a configuration diagram of an elevator management system in an embodiment.
[FIG. 3] FIG. 3 is a configuration diagram of a destination entry device 40 in an embodiment.
[FIG. 4] FIG. 4 is a specific example of an operation panel surface of the destination entry device 40 in an embodiment.
[FIG. 5] FIG. 5 is a flowchart showing a processing procedure of the destination entry device 40 in an embodiment.
[FIG. 6] FIG. 6 is a configuration example in a case where output of an operation detector in an embodiment is used for determination of a congestion degree.
[FIG. 7] FIG. 7 is an explanatory view of operation detection in a modification in an embodiment.

Description of Embodiments

[0010] An embodiment of the present invention will be described below with reference to the drawings.

Embodiment

[0011] FIG. 1 is an explanatory view for destination entry in the embodiment. As illustrated in FIG. 1, a passenger who gets on a car of an elevator can designate a desired destination floor by contactlessly operating the

destination entry device 40. The destination entry device 40 includes an infrared sensor or a capacitance sensor as an operation detector, and detects operation by the passenger using a distance threshold and a time threshold. That is, upon detecting an object continuously for a time equal to or greater than the time threshold at a short distance equal to or less than the distance threshold, the operation detector enters the destination floor, regarding as an operation of entering the destination floor.

[0012] Here, the destination entry device 40 determines the congestion degree of the car and changes the distance threshold and the time threshold. Specifically, when the car is vacant, the destination entry device 40 increases the distance threshold and decreases the time threshold. As a result, the passenger can establish the destination entry operation at a position sufficiently away from the destination entry device 40, and it is possible to reduce the risk of infectious diseases due to contact.

[0013] On the other hand, when the distance threshold is large and the time threshold is small, there is a possibility that an erroneous operation occurs. In particular, when the car is congested, the body or baggage of the passenger unintentionally approaches the operation detector, and there is a high possibility of erroneous recognition that an operation of entering the destination floor is performed. Therefore, when the car is congested, the destination entry device 40 prevents erroneous operation by decreasing the distance threshold and increasing the time threshold.

[0014] Thus, by changing the distance threshold and the time threshold related to the operation detection in accordance with the congestion degree of the car, the destination entry device 40 achieves separated destination entry operation while preventing erroneous operation.

[0015] FIG. 2 is a configuration diagram of the elevator management system. As illustrated in FIG. 1, the elevator management system includes an operation manager 10, an ascent and descent controller 30, the destination entry device 40, and a service request device 50.

[0016] The ascent and descent controller 30 and the destination entry device 40 are provided for each car of the elevator. The ascent and descent controller 30 is a device that controls ascending and descending of the car in response to an instruction from the operation manager 10. The destination entry device 40 receives destination entry operation in the car.

[0017] The service request device 50 is provided for each landing hall of each floor. Here, the floor is to identify a floor forming a hierarchy in a building in which an elevator is installed. The car of the elevator moves in an up-down direction on the hierarchal floor, and the current location and the destination floor at that time are identified by the floor. The service request device 50 includes a button corresponding to the direction of the destination floor (upward and/or downward). Operation on this button is a request for a service from a passenger to the elevator, that is, a "call". Upon receiving button operation, the service request device 50 notifies the operation manager 10 of the reception of the service request. The reception notification of this service request includes the floor of the landing hall where the service request is received and the direction of the destination floor.

[0018] Upon receiving the reception notification of the service request from the service request device 50, the operation manager 10 refers to the current location, the destination floor, and the like of each elevator, and allocates the elevator to the service request. The allocated elevator enters the floor of the service request source as the destination floor, and carries the passenger waiting at the landing hall.

[0019] FIG. 3 is a configuration diagram of the destination entry device 40. As illustrated in FIG. 3, the destination entry device includes a load sensor 41, an operation detector 42, a destination floor display 43, a congestion degree determiner 44, a threshold changer 45, and an entry unit 46.

[0020] The load sensor 41 is a sensor that detects a load applied to the car. The operation detector 42 is an infrared sensor, a capacitance sensor, or the like, and is used to contactlessly detect operation of designating the destination floor by the passenger. The destination floor display 43 displays a floor that is a candidate for the destination floor, that is, a floor where the car can be stopped.

[0021] The destination floor display 43 is provided for each floor that is a candidate for the destination floor, and lights up the floor entered as the destination floor. Since the operation detector 42 is also provided for each destination floor display 43, it corresponds to each floor that is a candidate for the destination floor.

[0022] The congestion degree determiner 44 is a processing unit that determines the congestion degree of the car. The congestion degree determiner 44 determines the congestion degree on the basis of the output of the load sensor 41. The larger the number of passengers in the car is, the larger the output of the load sensor 41 is, and the larger the congestion degree is. When the congestion degree increases, the standing position and the body motion of the passenger are restricted, and therefore it is considered that the possibility that the passenger is present near the operation detector 42 increases, and erroneous detection increases.

[0023] The threshold changer 45 changes the distance threshold and the time threshold related to the detection of the operation on the basis of a determination result by the congestion degree determiner 44. Specifically, the threshold changer 45 makes the distance threshold in a case where the congestion degree is equal to or greater than a predetermined threshold smaller than the distance threshold in a case where the congestion degree is less than the predetermined threshold. The threshold changer 45 makes the time threshold in a case where the congestion degree is equal to or greater than a predetermined threshold smaller than the time threshold in a case where the congestion degree is less than the predetermined threshold.

[0024] By comparing the distance threshold and the time threshold that are set by the threshold changer 45 with the output of the operation detector 42, the entry unit 46 identifies whether or not the operation is operation of entering the destination floor. As a result, in the case where an identification result indicating that the operation is operation of entering the destination floor is obtained, the destination floor is entered.

[0025] Specifically, in a case where any operation detector 42 detects an object present closer than the distance threshold and the state continues for equal to or greater than the time threshold, the entry unit 46 enters, as the destination floor, the floor associated with the operation detector.

[0026] In a case where a passenger leans near the operation detector 42 or the like, there is a possibility that entry of a destination floor against the intention of the passenger occurs. Therefore, the entry unit 46 cancels the entry of the destination floor when the operation detector 42 continues a state of detecting an object present closer than the distance threshold for equal to or greater than a predetermined time even after the entry of the destination floor. The predetermined time at this time is called a cancellation threshold for convenience. The cancellation threshold is made sufficiently larger than the time threshold set in the threshold changer 45. For example, the time threshold is changed within a range of equal to or less than 1 second, and the cancellation threshold is set to about 10 seconds.

[0027] FIG. 4 is a specific example of the operation panel surface of the destination entry device 40. In FIG. 4, the destination floor display 43 and the operation detector 42 corresponding to the floors "B1" to "5F" are provided. In FIG. 4, "4F" is already entered as the destination floor, and the destination floor display 43 of "4F" is lit.

[0028] FIG. 5 is a flowchart showing the processing procedure of the destination entry device 40. In FIG. 5, N1, N2, and N3 are used as thresholds for the congestion degree, where N1 < N2 < N3 is established. As the distance thresholds, DS, DM, and DL are used, where DS < DM < DL is established. As the time thresholds, TS, TM, and TL are used, where TS < TM < TL is established. The destination entry device 40 repeatedly executes the processing procedure illustrated in FIG. 5 at a predetermined time interval.

[0029] First, the congestion degree determiner 44 of the destination entry device 40 determines the congestion degree on the basis of the output of the load sensor 41 (step S101). If the congestion degree is smaller than N1 (step S102; Yes), the threshold changer 45 sets the distance threshold to DL and sets the time threshold to TS (step S103) .

[0030] If the congestion degree is equal to or greater than N1 and less than N2 (step S102; No, S104; Yes), the threshold changer 45 sets the distance threshold to DM and sets the time threshold to TM (step S105). If the congestion degree is equal to or greater than N2 and less than N3 (step S104; No, S106; Yes), the threshold changer 45 sets the distance threshold to DS and sets the time threshold to TL (step S107). If the congestion degree is equal to or greater than N3, the processing ends as it is.

[0031] After step S103, step S105, or step S107, the entry unit 46 determines whether or not a detection distance, which is the distance to the closest object detected by the operation detector 42, is less than the distance threshold for each operation detector 42 (step S108).

[0032] If the detection distance is less than the distance threshold (step S108; Yes), the entry unit 46 adds the detection time (step S110). If the detection distance is equal to or greater than the distance threshold (step S108; No), the entry unit 46 clears the detection time added so far (step S109), and ends the processing.

[0033] After step S110, the entry unit 46 determines whether or not the detection time becomes equal to or greater than the time threshold (step 5111). If the detection time is less than the time threshold (step S111; No), the entry unit 46 ends the processing as it is.

[0034] If the detection time is equal to or greater than the time threshold (step S111; Yes), the entry unit 46 determines whether or not the detection time becomes equal to or greater than the cancellation threshold (step S112). If the detection time is equal to or greater than the time threshold (step S112; Yes), the entry unit 46 enters the destination floor (step S113), and ends the processing. If the detection time is less than the time threshold (step S112; No), the entry unit 46 cancels the entry of the destination floor (step S114), and ends the processing.

(Modification)

[0035] In the above description, the output of the load sensor 41 has been used for the determination of the congestion degree, but the congestion degree indicates how much the standing position and the body motion of the passenger in the car are restricted, and the congestion degree can be determined using an optional index not limited to the load. For example, the determination may be made by imaging inside of the car. At this time, even if the number of passengers is small, the congestion degree is determined to be high if the standing position and the body motion of the passengers are restricted due to a large piece of baggage being loaded. Output of a plurality of the operation detectors 42 may be used for determination of the congestion degree.

[0036] FIG. 6 is a configuration example in a case where output of the operation detector 42 is used for determination of the congestion degree. In the configuration illustrated in FIG. 6, output of the operation detector 42 is input to both the congestion degree determiner 44 and the entry unit 46. The congestion degree determiner 44 determines the congestion degree on the basis of the output of the plurality of operation detectors 42, and the threshold changer 45 sets the threshold on the basis of this congestion degree. Therefore, the entry unit 46 com-

pares the detection output of each of the plurality of operation detectors 42 with the detection output of the plurality of other operation detectors 42 to identify the destination floor entry operation.

[0037] FIG. 7 is an explanatory view of operation detection in the modification. In FIG. 7, an operation detector 42a, an operation detector 42b, and an operation detector 42c each output a detection distance that is a distance to a closest object. Since the passenger operates a destination floor display 43b corresponding to the operation detector 42b, the detection distance output by the operation detector 42b is significantly smaller than the detection distances output by the operation detector 42a and the operation detector 42c. The detection distances output from the operation detector 42a and the operation detector 42c is considered to become small in a congested car.

[0038] Therefore, if the congestion degree determiner 44 determines the congestion degree using the output of the plurality of operation detectors 42 (the operation detector 42a, the operation detector 42b, the operation detector 42c, and the like) and sets the distance threshold, the destination floor entry operation by the passenger can be appropriately detected.

[0039] As described above, according to the present invention, the destination entry device 40 that receives operation by a passenger of an elevator and enters a destination floor includes: the congestion degree determiner 44 as a determiner that determines a congestion degree of a car of the elevator; the operation detector 42 that contactlessly detects an operation of designating the destination floor; the threshold changer 45 that changes a threshold related to a distance in accordance with the congestion degree regarding the contactless detection; and the entry unit 46 that enters the destination floor when a detection result that satisfies the threshold related to the distance is obtained. Such configuration and operation make it possible to perform separated destination entry operation while preventing erroneous operation.

[0040] Since the threshold changer 45 makes a threshold related to the distance in a case where the congestion degree is equal to or greater than a predetermined threshold smaller than a threshold related to the distance in a case where the congestion degree is less than the predetermined threshold, it is possible to prevent erroneous operation when it is congested and to detect operation sufficiently separated from the operation panel surface when it is vacant.

[0041] Since the threshold changer 45 further changes a threshold related to time for the contactless detection in accordance with the congestion degree, it is possible to prevent erroneous operation with higher accuracy.

[0042] Since the determiner determines the congestion degree on the basis of output of the load sensor 41 provided in the car, it is possible to determine the congestion degree by effectively using existing equipment of the car.

[0043] The determiner may determine the congestion degree on the basis of an image obtained by imaging inside of the car. Imaging inside of the car can be performed by a camera installed for crime prevention, for example.

[0044] The operation detector 42 is provided in association with each floor that is a candidate for the destination floor, and when any operation detector 42 detects an object present closer than a threshold related to the distance, the entry unit 46 enters, as the destination floor, a floor associated with the operation detector, and therefore it is possible to easily and reliably detect operation on the destination floor.

[0045] The entry unit cancels entry of the destination floor when the operation detector continues a state of detecting an object present closer than a threshold related to the distance for equal to or greater than a predetermined time even after entry of the destination floor, and therefore it is possible to cancel unintended entry by a passenger due to leaning or the like.

[0046] The determiner can more easily determine the congestion degree by determining the congestion degree on the basis of detection results by a plurality of the operation detectors 42 provided in association with the respective floors.

[0047] The present invention is not limited to the above-described embodiment, and includes various modifications. For example, the embodiment described above has been described in detail for the purpose of describing the present invention in an easy-to-understand manner, and is not necessarily limited to one having all the configurations described above. The configuration can not only be deleted but also be replaced or added.

[0048] For example, a physical button for entering a destination floor may be further provided, and in a case where the congestion degree is equal to or greater than a predetermined value, contactless detection may be stopped and destination floor entry operation may be performed using the physical button.

Reference Signs List

[0049]

10	operation manager
30	ascent and descent controller
40	destination entry device
41	load sensor
42	operation detector
43	destination floor display
44	congestion degree determiner
45	threshold changer
46	entry unit
50	service request device

Claims

1. A destination entry device that receives operation by a passenger of an elevator and enters a destination floor, the destination entry device comprising:

   a determiner that determines a congestion degree of a car of the elevator;
   an operation detector that contactlessly detects an operation of designating the destination floor;
   a threshold changer that changes a threshold related to a distance in accordance with the congestion degree regarding the contactless detection; and
   an entry unit that enters the destination floor when a detection result that satisfies the threshold related to the distance is obtained.

2. The destination entry device according to claim 1, wherein the threshold changer makes a threshold related to the distance in a case where the congestion degree is equal to or greater than a predetermined threshold smaller than a threshold related to the distance in a case where the congestion degree is less than the predetermined threshold.

3. The destination entry device according to claim 2, wherein the threshold changer further changes a threshold related to time for the contactless detection in accordance with the congestion degree.

4. The destination entry device according to claim 3, wherein the determiner determines the congestion degree on a basis of output of a load sensor provided in the car.

5. The destination entry device according to claim 3, wherein the determiner determines the congestion degree on a basis of an image obtained by imaging inside of the car.

6. The destination entry device according to claim 3, wherein

   the operation detector is provided in association with each floor that is a candidate for the destination floor, and
   when any operation detector detects an object present closer than the threshold related to the distance, the entry unit enters, as the destination floor, a floor associated with the operation detector.

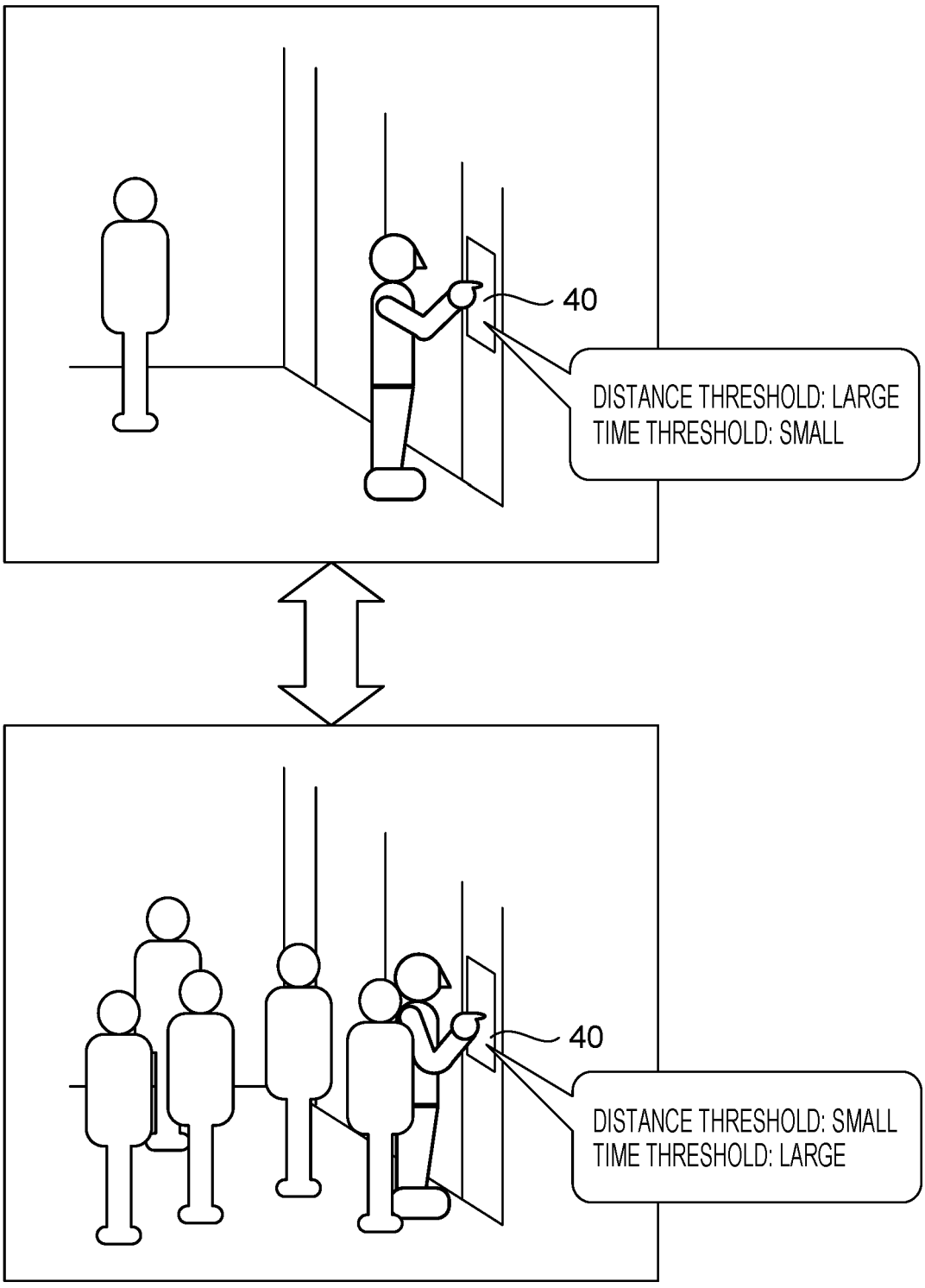
7. The destination entry device according to claim 6, wherein the entry unit cancels entry of the destination floor when the operation detector continues a state of detecting the object present closer than the threshold related to the distance for equal to or greater than a predetermined time even after entry of the destination floor.

8. The destination entry device according to claim 6, wherein the determiner determines the congestion degree on a basis of detection results by a plurality of the operation detectors provided in association with the respective floors.

9. A destination entry method to receive operation by a passenger of an elevator and enter a destination floor, the destination entry method comprising:

   a determination step of determining a congestion degree of a car of the elevator;
   an operation detection step of contactlessly detecting an operation of designating the destination floor;
   a threshold change step of changing a threshold related to a distance in accordance with the congestion degree regarding the contactless detection; and
   an entry step of entering the destination floor when a detection result that satisfies the threshold related to the distance is obtained.

FIG. 1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DISTANCE THRESHOLD: LARGE
TIME THRESHOLD: SMALL
40
DISTANCE THRESHOLD: SMALL
TIME THRESHOLD: LARGE

FIG. 2

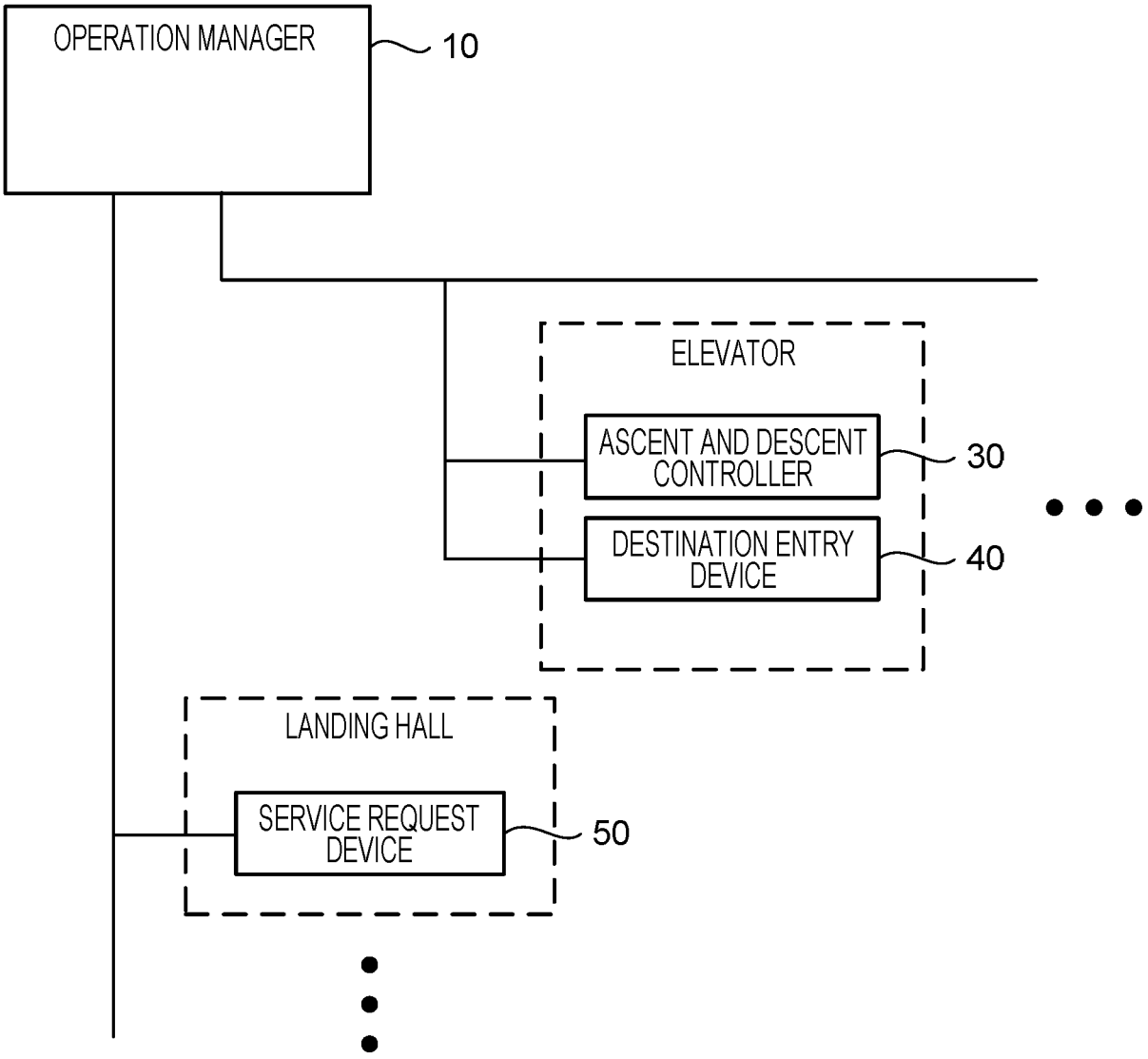

OPERATION MANAGER
10
ELEVATOR
ASCENT AND DESCENT CONTROLLER
30
DESTINATION ENTRY DEVICE
40
LANDING HALL
SERVICE REQUEST DEVICE
50

FIG. 3

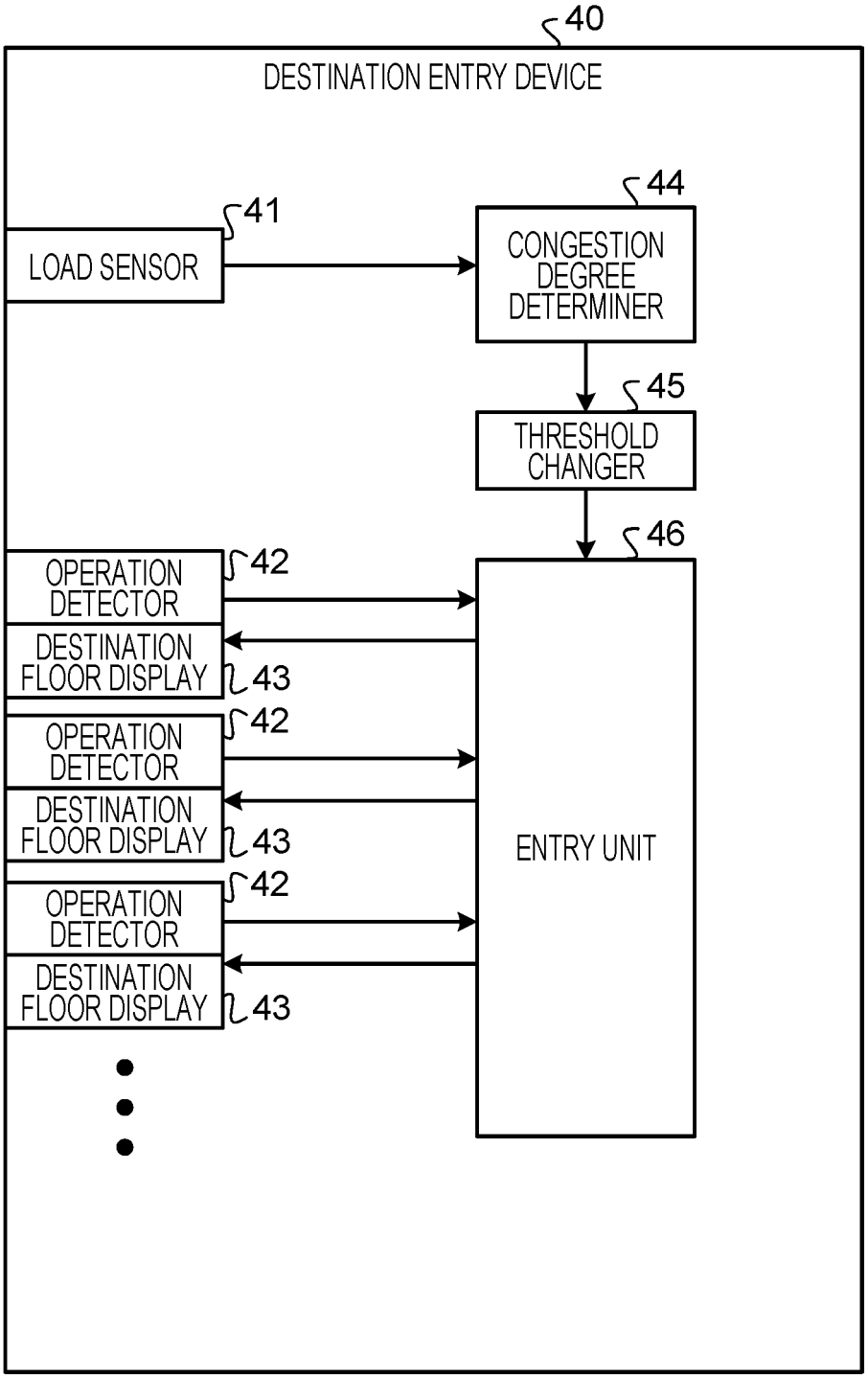

40
DESTINATION ENTRY DEVICE
41
LOAD SENSOR
44
CONGESTION DEGREE DETERMINER
45
THRESHOLD CHANGER
46
ENTRY UNIT
42
OPERATION DETECTOR
43
DESTINATION FLOOR DISPLAY
42
OPERATION DETECTOR
43
DESTINATION FLOOR DISPLAY
42
OPERATION DETECTOR
43
DESTINATION FLOOR DISPLAY

FIG. 4

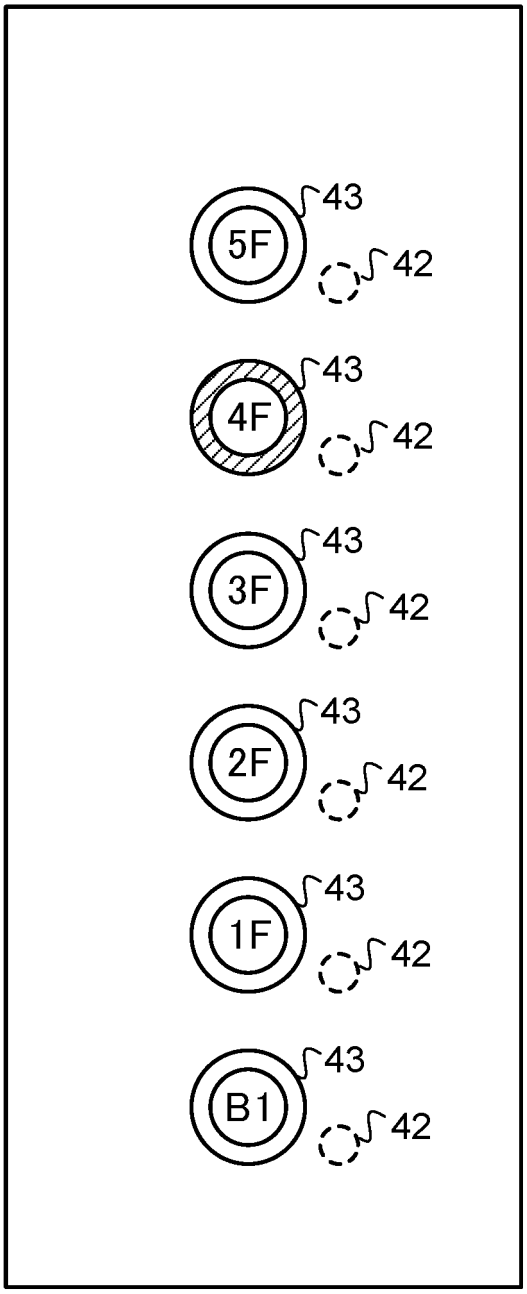


FIG. 5

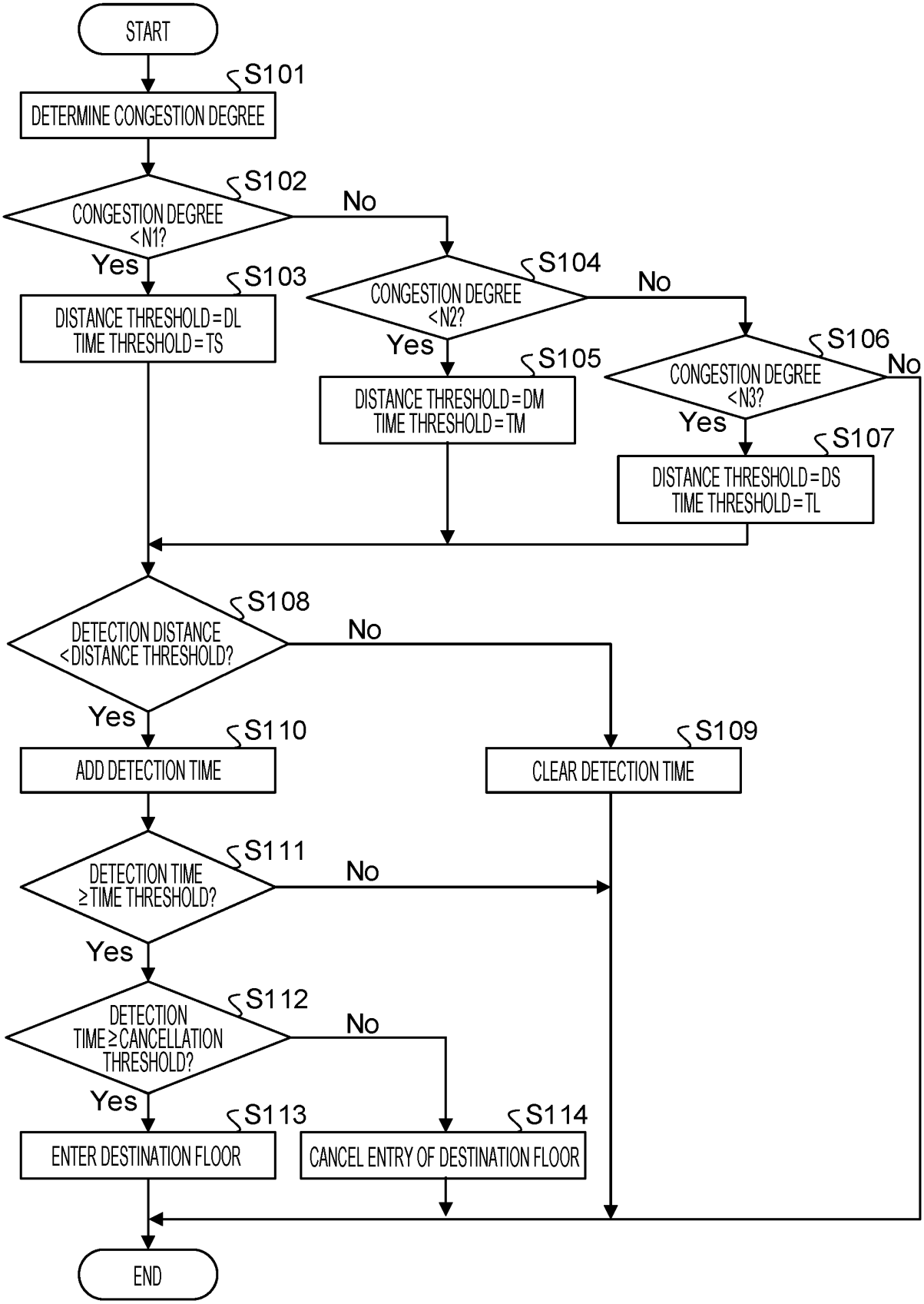
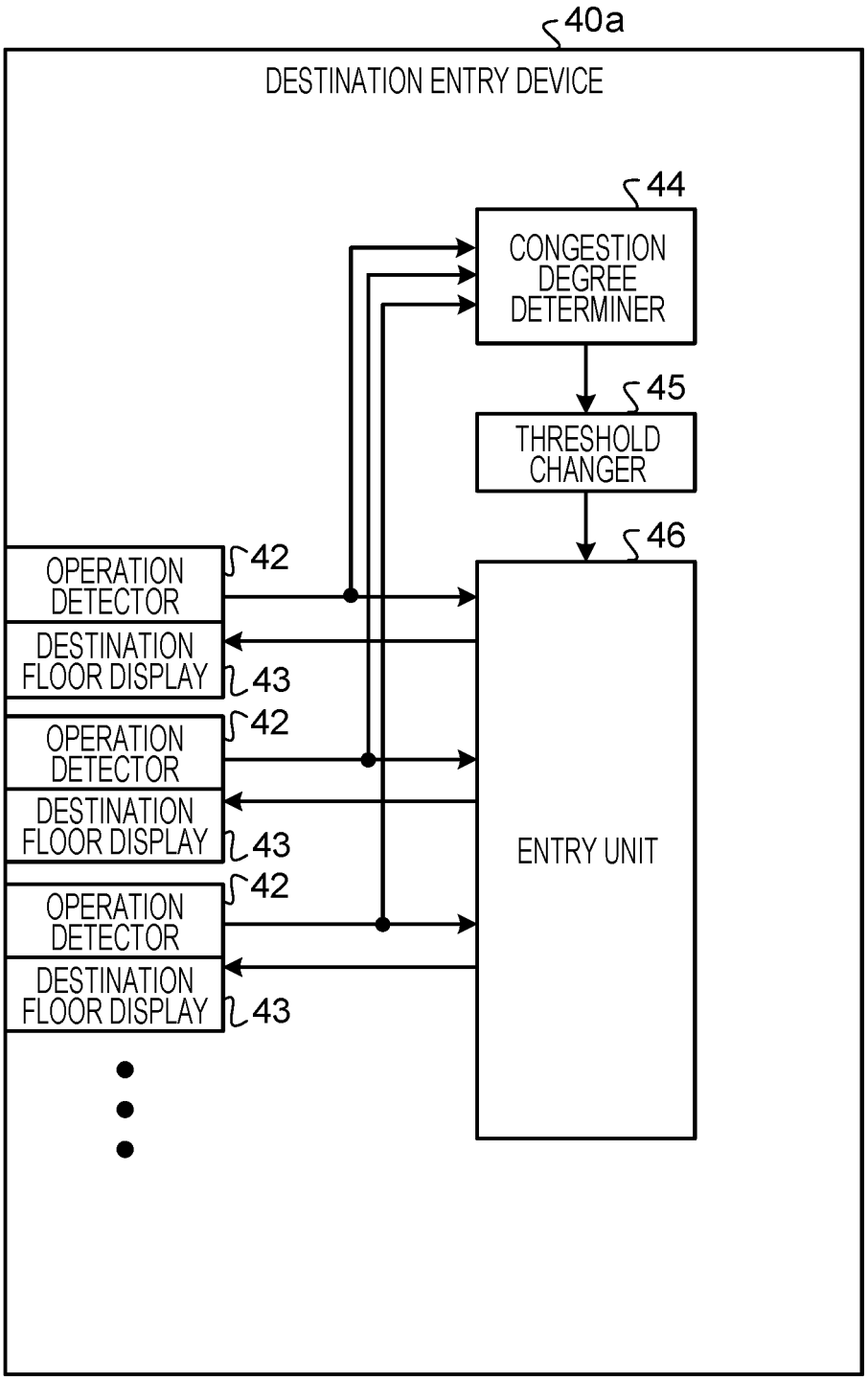

START
S101
DETERMINE CONGESTION DEGREE
S102
CONGESTION DEGREE <N1?
No
Yes
S103
DISTANCE THRESHOLD=DL
TIME THRESHOLD=TS
S104
CONGESTION DEGREE <N2?
No
Yes
S105
DISTANCE THRESHOLD=DM
TIME THRESHOLD=TM
S106
CONGESTION DEGREE <N3?
No
Yes
S107
DISTANCE THRESHOLD=DS
TIME THRESHOLD=TL
S108
DETECTION DISTANCE <DISTANCE THRESHOLD?
No
Yes
S110
ADD DETECTION TIME
S109
CLEAR DETECTION TIME
S111
DETECTION TIME ≥TIME THRESHOLD?
No
Yes
S112
DETECTION TIME≥CANCELLATION THRESHOLD?
No
Yes
S113
ENTER DESTINATION FLOOR
S114
CANCEL ENTRY OF DESTINATION FLOOR
END

FIG. 6


40a
DESTINATION ENTRY DEVICE
44
CONGESTION DEGREE DETERMINER
45
THRESHOLD CHANGER
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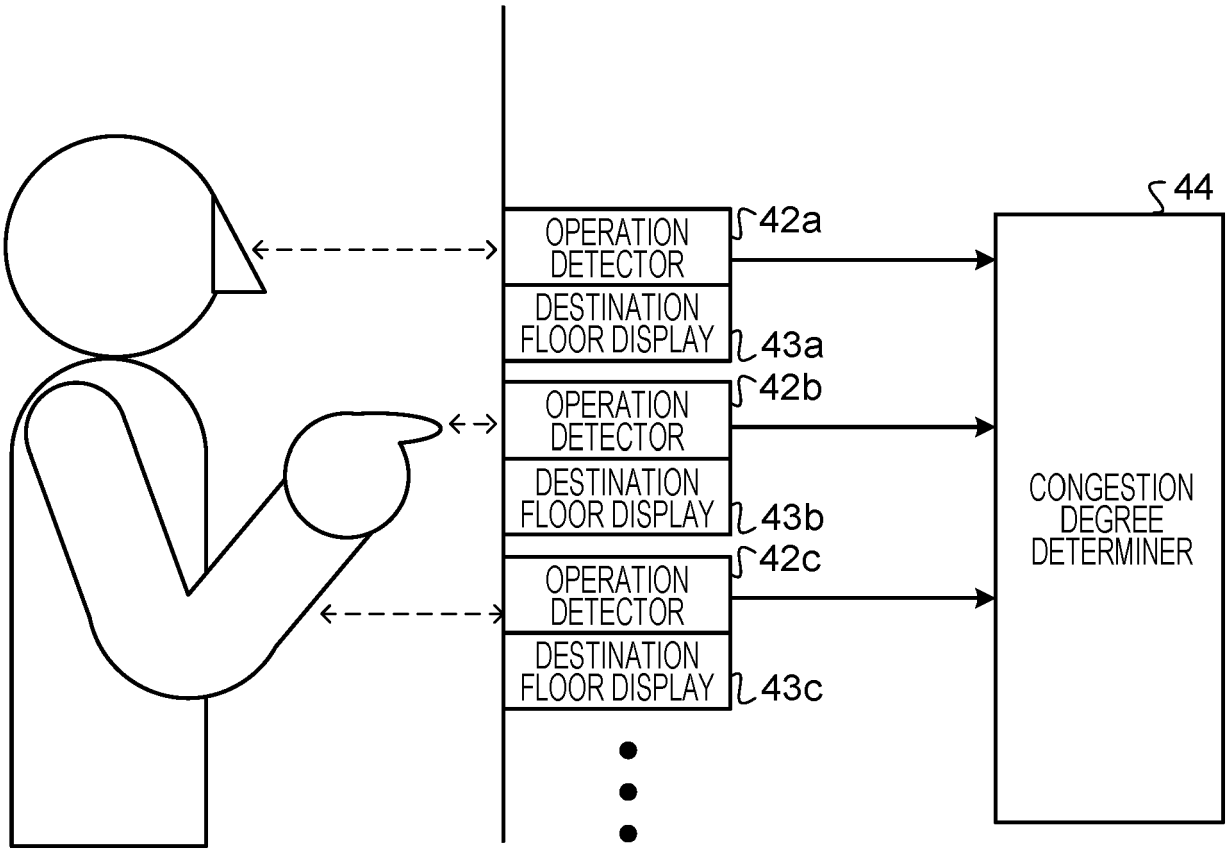
DESTINATION FLOOR DISPLAY
43
OPERATION DETECTOR
42
DESTINATION FLOOR DISPLAY
43
OPERATION DETECTOR
42
DESTINATION FLOOR DISPLAY
43
ENTRY UNIT

FIG. 7


OPERATION DETECTOR
42a
DESTINATION FLOOR DISPLAY
43a
OPERATION DETECTOR
42b
DESTINATION FLOOR DISPLAY
43b
OPERATION DETECTOR
42c
DESTINATION FLOOR DISPLAY
43c
44
CONGESTION DEGREE DETERMINER

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/036427

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. B66B3/00(2006.01)i, B66B1/14(2006.01)i, B66B1/50(2006.01)i
FI: B66B1/50 Z, B66B1/14 L, B66B3/00 L

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. B66B1/00-3/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2020
Registered utility model specifications of Japan 1996-2020
Published registered utility model applications of Japan 1994-2020

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.
A	JP 2019-142686 A (FUJITEC KK) 29 August 2019 (2019-08-29)	1-9
A	JP 2013-124166 A (MITSUBISHI ELECTRIC BUILDING TECHNO-SERVICE CO., LTD.) 24 June 2013 (2013-06-24)	1-9
A	CN 105923479 A (SHANGHAI SMARFID SECURITY EQUIPMENT CO., LTD.) 07 September 2016 (2016-09-07)	1-9
A	JP 2011-162307 A (MITSUBISHI ELECTRIC CORP.) 25 August 2011 (2011-08-25)	1-9

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

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Date of the actual completion of the international search	Date of mailing of the international search report
16.11.2020	24.11.2020
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/036427

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
JP 2019-142686 A	29.08.2019	(Family: none)	
JP 2013-124166 A	24.06.2013	(Family: none)	
CN 105923479 A	07.09.2016	(Family: none)	
JP 2011-162307 A	25.08.2011	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2015151253 A **[0002] [0003]**