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(71) Applicant: **Mitsubishi Electric Corporation**
Tokyo 100-8310 (JP)

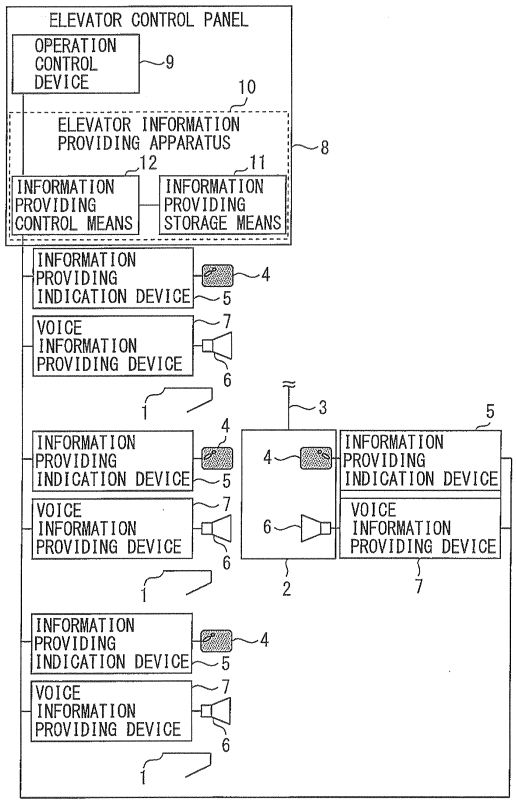
(72) Inventor: **TANIYAMA, Kenji**
Tokyo 100-8310 (JP)

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

(54) ELEVATOR GUIDANCE DEVICE

(57) Provided is an information providing apparatus of an elevator which can appropriately provide each piece of information of the elevator. For this purpose, the information providing apparatus of an elevator includes storage means in which each piece of information to be provided by notification means provided in a hall or a car of the elevator and priorities are stored by being correlated to each other, and control means which selects information to be provided by the notification means by comparing priorities of multiple pieces of information in the case where conditions for providing the multiple pieces of information hold. The storage means stores priorities of the multiple pieces of information by being correlated to an elapsed time after the start of information providing. In the case where a condition for providing second information has held during the providing of first information, the control means compares the priority of the second information corresponding to a point of time of information providing with the priority of the first information corresponding to a point of time which has elapsed until a condition of providing the second information holds after the start of information providing, and selects continuing to provide the first information or starting to provide the second information by suspending providing the first information.

FIG. 1



EP 2 669 236 A1

Description

Technical Field

[0001] The present invention relates to an information providing apparatus of an elevator.

Background Art

[0002] An elevator is equipped with an information providing apparatus. Various kinds of information, such as the operating situation and operation predictions of the elevator, disaster situation and descriptions of floors at which the elevator stops, are stored in the information providing apparatus. For each piece of information, the condition for providing information (the timing of providing information) is set beforehand in the information providing apparatus. The information providing apparatus controls notification means so that the notification means provides information for which the condition has held.

[0003] It is possible to conceive a method of continuing the providing of information which is being provided in the case where the condition for providing another piece of information has hold while a certain piece of information is being provided. According to this method, it is ensured that the information providing is completed if once information providing is started. For this reason, it is possible to positively communicate information to an elevator user.

[0004] However, even if a condition for providing important information has held while a certain piece of information is being provided, the important information is not provided or the start of information providing becomes delayed. As a result, information may sometimes be provided at wrong timing. For example, the information "the door will open" may sometimes be provided after the completion of door opening.

[0005] In contrast to this, it is also possible to conceive a method which is such that in the case where a condition for providing another piece of information has held while a certain piece of information is being provided, the information for which the new condition has held is provided by suspending the providing of the information which is being provided. According to this method, it is possible to instantaneously communicate up-to-date information to an elevator user.

[0006] However, even when the information which is being provided is important, the information providing is suspended. For this reason, in some cases, important information is not communicated to an elevator user.

[0007] In contrast to these methods, there has been proposed a method by which priorities are set according to the contents of the information to be provided. According to this method, in the case where a condition for providing important information has held while unimportant information is being provided, the providing of the unimportant information is suspended and the important information can be provided. That is, the important information is instantaneously provided. On the other hand, in the case where a condition for providing another piece of information has held while important information is being provided, it is possible to delay the start of the providing of other information. That is, the providing of important information is not impeded by the providing of other information (refer to Patent Literature 1, for example).

Citation List

Patent Literature

[0008]

Patent Literature 1: Japanese Patent Laid-Open No. 2002-127905

[0009] If this method is applied to en elevator, important information is positively communicated to an elevator user at right timing. For this reason, it is possible to increase the feeling of security of an elevator user.

Summary of Invention

Technical Problem

[0010] However, in the method described in Patent Literature 1, the priorities of each piece of information are uniquely set. For this reason, for example, when an indication device is caused to indicate information, in the case where a condition for indicating information having a priority lower than the priority of the information which is bering indicated has held, the information having the lower priority is not indicated unless an indication continuation time which is set beforehand elapses. That is, even when a sufficient time has elapsed after the indication of the information which is being indicated, it is impossible to indicate up-to-date information.

[0011] The present invention was made to solve the problem described above and the object thereof is to provide an information providing apparatus of an elevator which can appropriately provide each piece of information on the elevator.

Means for Solving the Problems

[0012] An information providing apparatus of an elevator of the present invention includes storage means in which each piece of information to be provided by notification means provided in a hall or a car of the elevator and priorities are stored by being correlated to each other and control means which selects information to be provided by the notification means by comparing priorities of multiple pieces of information in the case where conditions for providing the multiple pieces of information hold, wherein the storage means stores priorities of the multiple pieces of information by being correlated to an

elapsed time after the start of information providing and wherein in the case where a condition for providing second information has held during the providing of first information, the control means compares the priority of the second information corresponding to a point of time of information providing with the priority of the first information corresponding to a point of time which has elapsed until a condition of providing the second information holds after the start of information providing, and selects continuing to provide the first information or starting to provide the second information by suspending providing the first information.

Advantageous Effect of Invention

[0013] According to the present invention, it is possible to appropriately provide each piece of information on an elevator.

Brief Description of the Drawings

[0014]

Fig. 1 is a block diagram of an elevator in which an information providing apparatus of an elevator in Embodiment 1 of the present invention is used.

Figs. 2 is a diagram to explain the priorities of information provided by the information providing apparatus of an elevator in Embodiment 1 of the present invention.

Figs. 3 is a diagram to explain the priorities of information provided by the information providing apparatus of an elevator in Embodiment 1 of the present invention.

Fig. 4 is a flowchart to explain a method by which the information proving apparatus of an elevator in Embodiment 1 of the present invention decides a candidate for information providing.

Fig. 5 is a flowchart to explain a method by which the information proving apparatus of an elevator in Embodiment 1 of the present invention decides information to be actually provided.

Description of Embodiment.

[0015] An embodiment of the present invention will be described with reference to the accompanying drawings. Incidentally, in each of the drawings, like numerals refer to like or corresponding parts and overlaps of description of these parts are appropriately simplified or omitted.

Embodiment 1

[0016] Fig. 1 is a block diagram of an elevator in which an information providing apparatus of an elevator in Embodiment 1 of the present invention is used. A traction machine, a signal transmission control device and the like which are necessary for actual elevator operations are in accordance with general configurations.

[0017] In Fig. 1, a hall 1 of an elevator is provided on each floor of a building. A shaft (not shown) of an elevator is formed in such a manner as to be adjacent to each hall 1. In the shaft, a car 2 of an elevator is disposed. The car 2 is suspended from a main rope 3. The main rope 3 moves according to the rotation of the traction machine. The car 2 ascends and descends according to this movement.

[0018] An indication screen 4 of an indication device of a liquid crystal and the like is provided as notification means in each hall 1 and car 2. Each indication screen 4 is connected to an information providing indication device 5. The information providing indication device 5 has the function of controlling images outputted by the indication screen 4. A speaker 6 is provided as notification means in each hall 1 and car 2. The speaker 6 is connected to a voice information providing device 7. The voice information providing device 7 has the function of controlling the voice outputted by the speaker 6.

[0019] An elevator control panel 8 is provided in a machine room (not shown) and the like of the elevator. An operation control device 9 and an elevator information providing apparatus 10 are provided in the elevator control panel 8. The operation control device 9 has the function of controlling the operations of the elevator, such as the action of the car 2 and the opening and closing of the door. The elevator information providing apparatus 10 is provided with information providing storage means 11 and information providing control means 12.

[0020] The information providing storage means 11 has the function of storing each piece of information on the information providing of the elevator. Data on an elapsed time of information providing and a completion time of information providing is correlated to each piece of information. Furthermore, data on priorities corresponding to an elapsed time of information providing is correlated to each piece of information.

[0021] The information providing control means 12 has the function of receiving information responding to the situation of the elevator and the surrounding from the operation control device 9. The information providing control means 12 has the function of recognizing the information for which a condition for providing information has held as an information providing request. The information providing control means 12 decides the information for which information providing is started from information providing requests and sets the information as a candidate for information providing.

[0022] The information providing control means 12 has the function of causing the indication screen 4 and the speaker 6 to output a candidate for information providing via the information providing indication device 5 and the voice information providing device 7. The information providing control means 12 has the function of causing the information providing storage means 11 to store the information which is being provided as information-providing storage information.

[0023] The information providing control means 12 has the function of making a comparison between the priority of information-providing storage information and the priority of a candidate for information providing in the case where information on information-providing storage information has already been stored in the information providing storage means 11. The information providing control means 12 has the function of selecting continuing to provide the information-providing storage information or starting anew to provide information on a candidate for information providing by suspending providing the information-providing storage information on the basis of the result of a priority comparison

[0024] Next, priorities of each piece of information will be described with the aid of Figs. 2 and 3.

Figs. 2 and 3 are diagrams to explain the priorities of information provided by the information providing apparatus of an elevator in Embodiment 1 of the present invention. The abscissas of Figs. 2 and 3 indicate an elapsed time of information providing. The ordinates of Figs. 2 and 3 indicate the priority of information.

[0025] The priority of each piece of information is set according to an elapsed time of information providing. Specifically, the priority of each piece of information is set on the basis of circumstances of the indication screen 4 and the speaker 6, whether or not the information is relatively important, whether or not the timing can produce a misunderstanding if the information providing is suspended, and the like.

[0026] Fig. 2 shows the priority set for the information providing voice of *"Ikkai de gozaimasu"* ("You are on the first floor") spoken in Japanese. For the initial value of the priority of Fig. 2, the priority is set to be lower than in other information. The priority set for the duration from the start of information providing until the information providing for "ikkai" (the first floor) is finished is kept at a fixed value. This fixed value is larger than the initial value. For this reason, it is ensured that this information providing is not suspended unless other information is important to a certain degree.

[0027] Let's consider the case where in Fig. 2 providing other information is edged in after *"de"* (on). In this case, *"ikkai die"* (on the first floor) can become modification words for other information. In this case, a misunderstanding can arise. For example, if "*ikkai de*" (on the first floor) becomes modification words for "Kasai ga hassei shimashita" ("A fire has broken out"), it can produce the misunderstanding that "Ikkai de kasai ga hassei shimashita" ("A fire has broken out on the first floor"). In order to avoid such a misunderstanding, the priority occurring while the information *"de go"* is being provided, is set at a value larger than the above-described fixed value. For this reason, it is ensured that the suspension of the information providing in question is prevented even when a condition for the providing of other information has held.

[0028] In Fig. 2, the pronunciation of the words after "*go*" is not important information. For this reason, there is no problem even if the information providing of the pronunciation of the words after "*go*" is not heard to the last. Therefore, the priority of the words after "*go*" is set in such a manner as to become low gradually.

[0029] Fig. 3 shows the priority set for the information providing voice of *"Kasai ga hassei shimashita*" ("A fire has broken out") spoken in Japanese. The breakout of a fire is important information. For this reason, the priority of "*kasai*" (a fire) is set at a high degree. The pronunciation of the words after "*kasai*" (a fire) is not important information. For this reason, there is no problem even if the information providing of the pronunciation of the words after "*kasai*" (a fire) is not heard to the last. Therefore, the priority of "*ga hassei*" (has broken out) is kept at a given value which is somewhat low.

[0030] If in Fig. 3 the time left until the completion time of information providing is short, there is no problem even if new information is provided after "*Kasai ga hassei shimashita*" ("A fire has broken out") is provided to the last. For this reason, the priority of "*shi*" and succeeding sounds, which are spoken immediately after "*ga hassei*", is set in such a manner as to increase gradually.

[0031] As described above, the priority of each piece of information can be set according to the philosophy of the designer of an elevator. That is, priority can be given to the communication of new information, and priority can be given to providing information to the last. This priority relationship can be similarly set also for images indicated on the indication screen 4.

[0032] Next, how to decide a candidate for information providing will be described concretely with the aid of Fig. 4.

Fig. 4 is a flowchart to explain a method by which the information proving apparatus of an elevator in Embodiment 1 of the present invention decides a candidate for information providing.

[0033] First, in Step S1 the operation control device 9 sets the situation of the elevator and the surrounding as an elevator status signal according to the control contents of the operation of the elevator. After that, the operation control device 9 outputs the elevator status signal to the information providing control means 12. After that, the flow of actions proceeds to Step S2, where the information providing control means 12 makes a determination, on the basis of the elevator status signal, as to whether or not an information providing condition for all pieces of information holds.

[0034] After that, the flow of actions proceeds to Step S3, where the information providing control means 12 makes a determination as to whether or not there are multiple information providing requests. In the case where no multiple information providing requests exist, the flow of actions proceeds to Step S4, where the information providing control means 12 makes a determination as to whether or not there is a single information providing request. In the case where there is no single information providing request, the flow of actions proceeds to Step S5. In Step S5 the information providing control means 12 finishes its actions by determining that

there is no candidate for information providing.

[0035] In contrast to this, in the case where in Step S4 there is a single information providing request, the flow of actions proceeds to Step S6. In Step S6, the information providing control means 12 sets the information providing request in question as a candidate for information providing and finishes its actions.

[0036] In the case where in Step S3 there are multiple information providing requests, the flow of actions proceeds to Step S7. In Step S7, the information providing control means 12 sets an information providing request having the highest initial value of priority for a candidate for information providing, and finishes its actions.

[0037] Next, how to decide information to be actually provided will be described concretely with the aid of Fig. 5.

Fig. 5 is a flowchart to explain a method by which the information proving apparatus of an elevator in Embodiment 1 of the present invention decides information to be actually provided.

[0038] First, in Step S11 the information providing control means 12 determines whether or not a candidate for information providing has been set by the actions of Fig. 4. In the case where there is no candidate for information providing, the flow of actions proceeds to Step S12. In Step S12, the information providing control means 12 makes a determination as to whether or not the timing in question is the timing at which the information providing is finished. Specifically, the information providing control means 12 makes a determination as to whether or not the elapsed time after the start of information providing corresponds to the completion time of information providing. In the case where information providing has not been started, the information providing control means 12 finishes its actions.

[0039] In the case where in Step S11 there is a candidate for information providing, the flow of actions proceeds to Step S13. In Step S13, the information providing control means 12 makes a determination as to whether or not information-providing storage information has been stored in the information providing storage means 11. In the case where there is no information providing storage, the flow of actions proceeds to Step S14.

[0040] In Step S14, the information providing control means 12 causes the indication screen 4 and the speaker 6 to provide information via the information providing indication device 5 and the voice information providing device 7. After that, the flow of actions proceeds to Step S 15, where the information providing control means 12 causes the information providing storage means 11 to store the information for which information providing has been started as information-providing storage information, and finishes its actions.

[0041] When in Step S 12 the timing becomes such that information providing is finished, with the condition that in Step S11 there is no new candidate for information providing kept, the flow of actions proceeds to Step S 16. In Step S 16, the information providing control means 12 erases the information-providing storage information stored in the information providing storage means 11, and finishes its actions.

[0042] In the case where in Step S11 there is a new candidate for information providing and in Step S 13 there is also information-providing storage information, the flow of actions proceeds to Step S 17. In Step S17, the information providing control means 12 compares the priority of the information which is being provided at the present point of time with an initial value of the priority of the new candidate for information providing. In the case where the priority of the information which is being provided at the present point of time is higher than the initial value of the priority of the new candidate for information providing, the information providing control means 12 continues the providing of the information which is being provided, and performs the actions of the Step S12 and succeeding steps.

[0043] In contrast to this, in the case where the initial value of the priority of a new candidate for information providing is higher than the priority of the information which is being provided at this point of time, the flow of actions proceeds to Step S18. In Step S18, the information providing control means 12 causes the indication screen 4 and the speaker 6 to suspend the providing of the information which is being provided via the information providing indication device 5 and the voice information providing device 7 and thereafter causes the indication screen 4 and the speaker 6 to provide information on a new candidate for information providing. After that, the flow of actions proceeds to Step S15, where the information providing control means 12 causes the information providing storage means 11 to store the new candidate for information providing as information-providing storage information, and finishes its actions.

[0044] According to Embodiment 1 described above, the priority of each piece of information is set in such a manner as to correspond to an elapsed time of information providing. As a result of this, it is possible to set a flexible priority relationship between pieces of information. Information to be provided is selected on the basis of priorities set in this manner. Specifically, in the case where a condition for providing second information has held while first information is being provided, the priority of the second information corresponding to a point of time of starting information providing is compared with the priority of the first information corresponding to a point of time which has elapsed until a condition for providing the second information has elapsed after the start of providing the first information. Information to be provided is selected on the basis of the result of this comparison. For this reason, it is possible to appropriately provide each piece of information on the elevator.

[0045] Specifically, for the information in which a misunderstanding can arise if information providing is suspended after information providing up to a prescribed part, a priority corresponding to a point of time which has elapsed by the providing of the prescribed part can be

set to be higher than the priority of other information corresponding to a point of time of start of information providing. In this case, it is possible to prevent a misunderstanding from being produced.

[0046] In the case where voice information providing is performed by the speaker 6, for each piece of information, priorities after a lapse of a prescribed time can be set to be higher than priorities until a lapse of the prescribed time. If setting is performed so that a difference between the time of completion of information providing and a prescribed time becomes constant, in the case where voice information providing is finished in a little while, it is ensured that other information providing can be performed after the voice information providing in question is finished.

[0047] In the case where information providing by indication is performed using the indication screen 4, for each piece of information, priorities until a lapse of a prescribed time can be set to be higher than priorities after a lapse of the prescribed time. In this case, it is possible to continue the information providing by indication in question until a condition for providing other information holds while ensuring an information indicating time which elapses until an elevator user finishes reading the indication contents.

[0048] For the information which must be provided to the last when once information providing is started, priorities after the start of information providing can be set to be higher than priorities at a point of time of the start of information providing. This information does not interrupt other information providing. For this reason, the timing of the start of information providing may sometimes be delayed to a certain extent. However, if once the information providing is started, it is possible to positively provide the information in question to the last.

[0049] In the case where the operating situation of the elevator changes during information providing, information providing may be suspended by edging in null information. In this case, the providing of information unsuited to the operating situation is suspended. For this reason, it is possible to prevent a misunderstanding from being generated.

[0050] In Embodiment 1, all information providing indication devices 5 and voice information providing devices 7 corresponding to the hall 1 and the car 2 are controlled by single information providing control means 12. For this reason, it is possible to select information to be provided with a simple configuration.

[0051] In contrast to this, if the information providing control means 12 is provided in each hall 1 and car 2, it is possible to control each information providing indication device 5 and each voice information providing device 7 independently. And, if the information providing for the hall 1 of the floor where the car 2 is stopped and the car 2 are controlled in synchronization only at the time when the door opens, information on getting on and off the car can be appropriately provided. Furthermore, if the indication information providing by the indication screen 4 and the voice information providing by the speaker 6 are controlled in synchronization with each other, it is possible to appropriately provide information to various users by indication and voice.

[0052] Furthermore, in Embodiment 1, a determination as to whether or not information is being provided, a comparison of priority and, other actions are performed in the interior of the elevator information providing apparatus 10. For this reason, it is possible to positively select information to be provided regardless of the indication screen 4 and the speaker 6.

[0053] In contrast to this, if it is ensured that the indication screen 4 and the speaker 6 output a signal indicating whether or not information is being provided and output priorities of the information which is being provided, then it is possible to appropriately provide each piece of information on the elevator while simplifying the elevator information providing apparatus 10.

[0054] The notification means may be at least either the indication screen 4 or the speaker 6.

Industrial Applicability

[0055] As described above, the information providing apparatus of an elevator of the present invention can be used in an elevator which appropriately provide each piece of information.

Description of symbols

[0056]

1	hall
2	car
3	main rope
4	indication screen
5	information providing indication device
6	speaker
7	voice information providing device
8	control panel
9	operation control device
10	elevator information providing apparatus
11	information providing storage means
12	information providing control means

Claims

1. An information providing apparatus of an elevator, comprising:

storage means in which each piece of information to be provided by notification means provided in a hall or a car of the elevator and priorities are stored by being correlated to each other; and

control means which selects information to be provided by the notification means by comparing priorities of multiple pieces of information in the

case where conditions for providing the multiple pieces of information hold;
wherein the storage means stores priorities of the multiple pieces of information by being correlated to an elapsed time after the start of information providing, and
wherein in the case where a condition for providing second information has held during the providing of first information, the control means compares the priority of the second information corresponding to a point of time of information providing with the priority of the first information corresponding to a point of time which has elapsed until a condition of providing the second information holds after the start of information providing, and selects continuing to provide the first information or starting to provide the second information by suspending providing the first information.

2. The information providing apparatus of an elevator according to claim 1, wherein the storage means stores the information in which a misunderstanding can arise if information providing is suspended after information providing up to a prescribed part in such a manner that a priority corresponding to a point of time which has elapsed by the providing of the prescribed part is set to be higher than the priority of other information corresponding to a point of time of start of information providing.

3. The information providing apparatus of an elevator according to claim 1, wherein the notification means comprises a speaker which provides each of the pieces of information by voice, and
wherein the storage means stores each of the pieces of information in such a manner that priorities after a lapse of a prescribed time are set to be higher than priorities until a lapse of the prescribed time.

4. The information providing apparatus of an elevator according to claim 1, wherein the notification means comprises an indication device which performs information providing by indicating each of the pieces of information, and
wherein the storage means stores each of the pieces of information in such a manner that priorities until a lapse of a prescribed time are set to be higher than priories after a lapse of the prescribed time.

5. The information providing apparatus of an elevator according to claim 1, wherein the storage means stores information which must be provided to the last when information providing is started in such a manner that priorities after the start of information providing are set to be higher than priorities at a point of time of the start of information providing.

6. The information providing apparatus of an elevator according to any of claims 1 to 5, wherein the storage means stores null information having a priority higher than the priorities of each of the pieces of information, and
wherein the control means receives information on an operating situation of the elevator and causes the notification means to suspend information providing by edging in the null information in the case where the information which is being provided has become unsuited to the operating situation.

FIG. 1

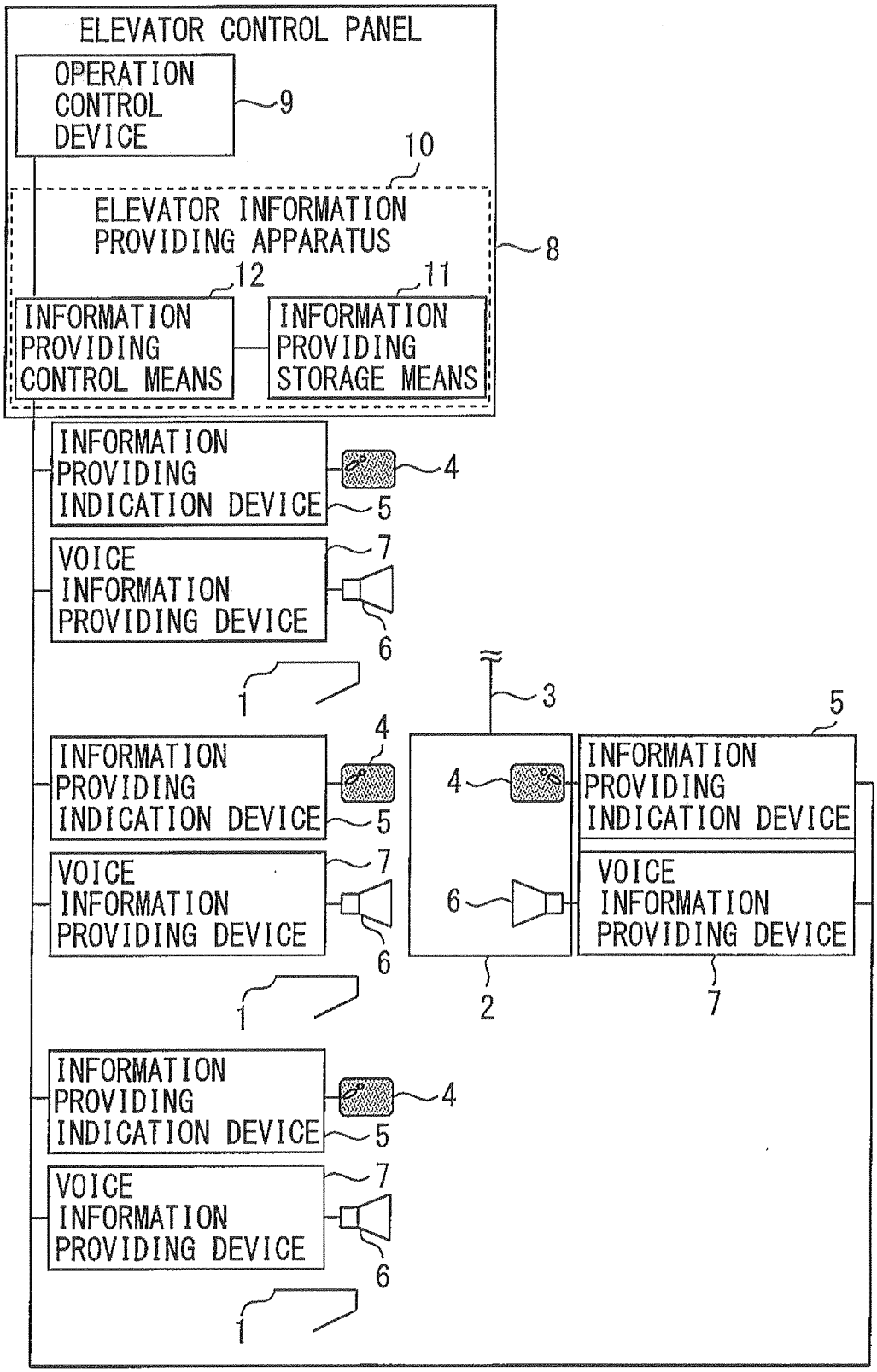

ELEVATOR CONTROL PANEL
OPERATION CONTROL DEVICE
9
10
ELEVATOR INFORMATION PROVIDING APPARATUS
8
12
11
INFORMATION PROVIDING CONTROL MEANS
INFORMATION PROVIDING STORAGE MEANS
INFORMATION PROVIDING INDICATION DEVICE
4
5
VOICE INFORMATION PROVIDING DEVICE
7
6
1
3
2

FIG. 2

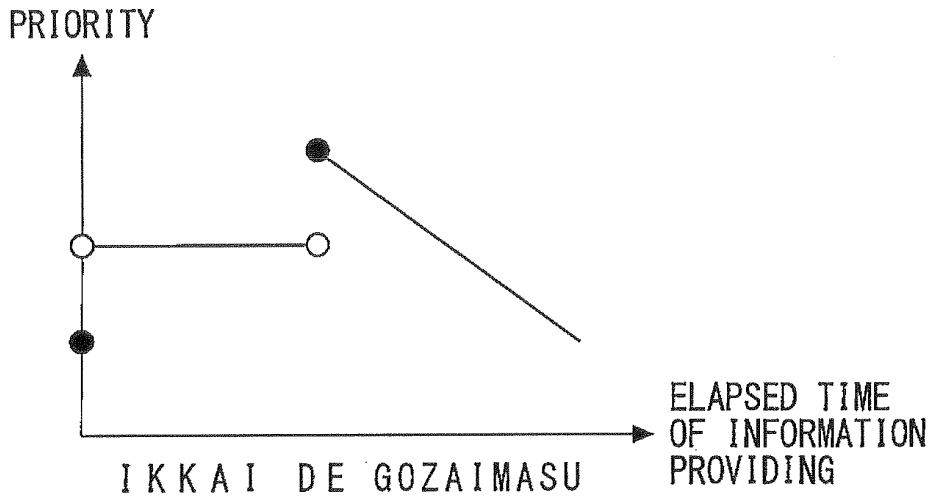

PRIORITY
ELAPSED TIME OF INFORMATION PROVIDING
I K K A I D E GOZAIMASU

FIG. 3

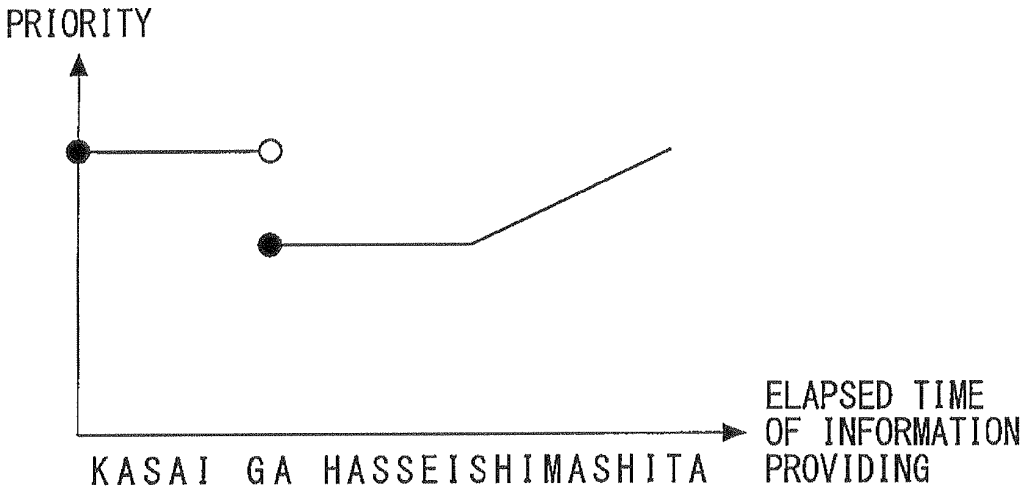

PRIORITY
ELAPSED TIME OF INFORMATION PROVIDING
KASAI GA HASSEISHIMASHITA

FIG. 4

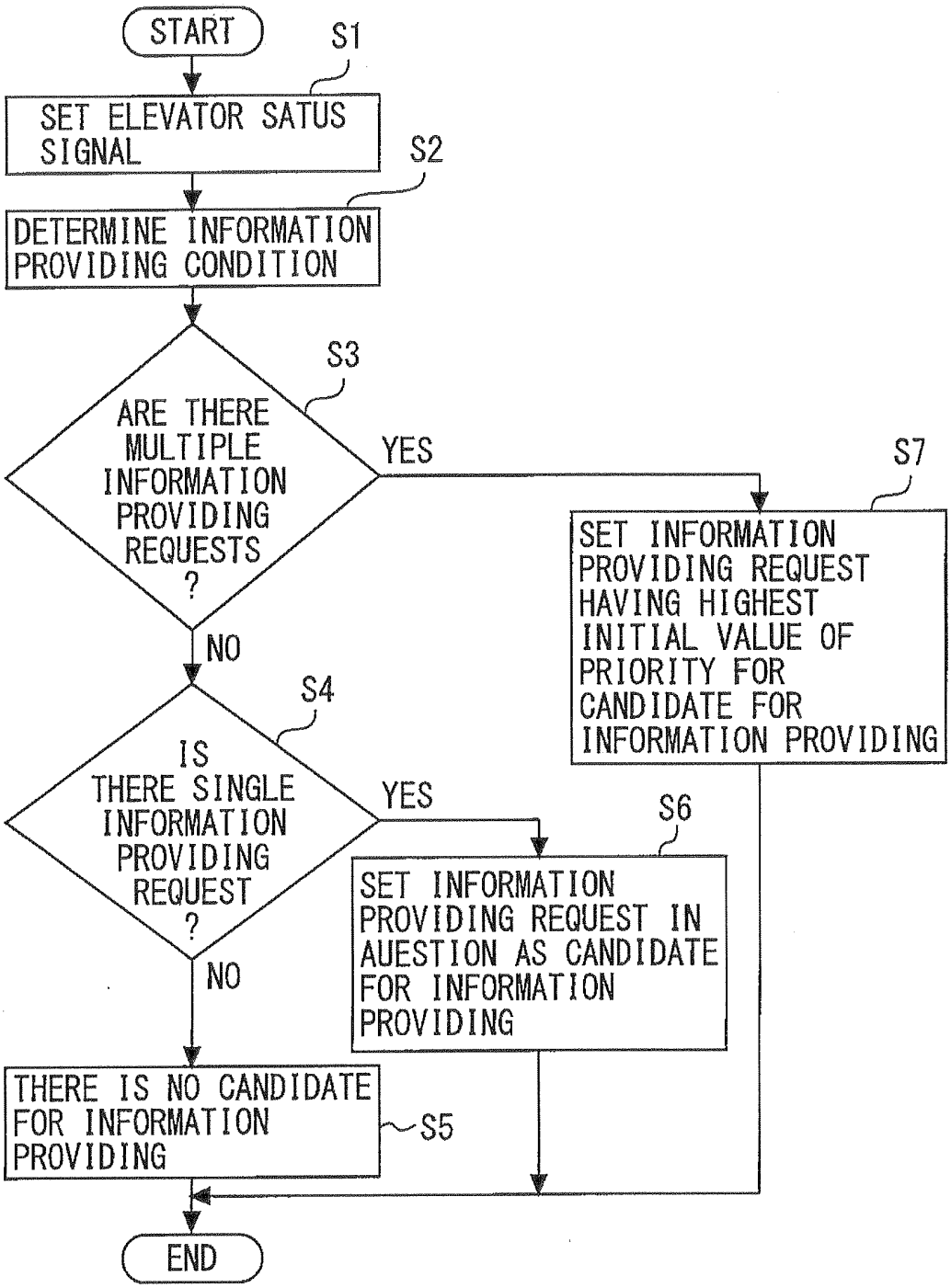
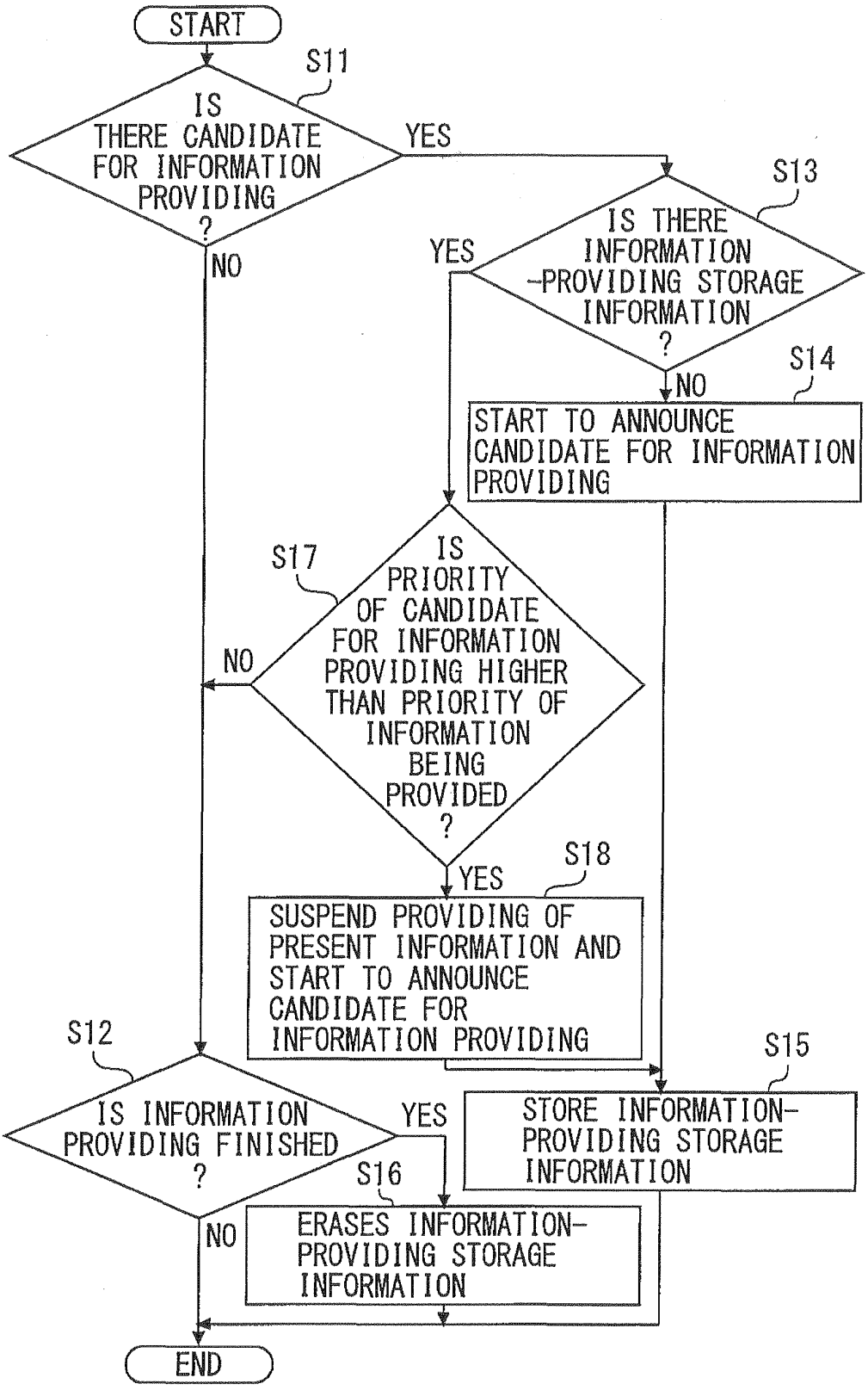

START
S1
SET ELEVATOR SATUS SIGNAL
S2
DETERMINE INFORMATION PROVIDING CONDITION
S3
ARE THERE MULTIPLE INFORMATION PROVIDING REQUESTS ?
YES
S7
SET INFORMATION PROVIDING REQUEST HAVING HIGHEST INITIAL VALUE OF PRIORITY FOR CANDIDATE FOR INFORMATION PROVIDING
NO
S4
IS THERE SINGLE INFORMATION PROVIDING REQUEST ?
YES
S6
SET INFORMATION PROVIDING REQUEST IN AUESTION AS CANDIDATE FOR INFORMATION PROVIDING
NO
THERE IS NO CANDIDATE FOR INFORMATION PROVIDING
S5
END

FIG. 5


START
S11
IS THERE CANDIDATE FOR INFORMATION PROVIDING ?
YES
NO
S13
IS THERE INFORMATION -PROVIDING STORAGE INFORMATION ?
YES
NO
S14
START TO ANNOUNCE CANDIDATE FOR INFORMATION PROVIDING
S17
IS PRIORITY OF CANDIDATE FOR INFORMATION PROVIDING HIGHER THAN PRIORITY OF INFORMATION BEING PROVIDED ?
NO
YES
S18
SUSPEND PROVIDING OF PRESENT INFORMATION AND START TO ANNOUNCE CANDIDATE FOR INFORMATION PROVIDING
S12
IS INFORMATION PROVIDING FINISHED ?
YES
NO
S15
STORE INFORMATION-PROVIDING STORAGE INFORMATION
S16
ERASES INFORMATION-PROVIDING STORAGE INFORMATION
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/051436

A. CLASSIFICATION OF SUBJECT MATTER
B66B3/00(2006.01)i, *G10L13/02*(2006.01)i

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)
B66B3/00, G10L13/02

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 1996-2011
Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011

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 2008-290836 A (Hitachi, Ltd., Hitachi Mito Engineering Co., Ltd.), 04 December 2008 (04.12.2008), entire text; all drawings & CN 101311093 A	1-6
A	JP 11-209012 A (Mitsubishi Electric Corp.), 03 August 1999 (03.08.1999), entire text; all drawings (Family: none)	1-6
A	JP 11-045099 A (Noritz Corp.), 16 February 1999 (16.02.1999), entire text; all drawings (Family: none)	1-6

☐ 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
14 July, 2011 (14.07.11)	26 July, 2011 (26.07.11)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2002127905 A **[0008]**