



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
11.08.2010 Bulletin 2010/32

(51) Int Cl.:
B66B 1/18 (2006.01)

(21) Application number: **07850295.2**

(86) International application number:
PCT/JP2007/073717

(22) Date of filing: **07.12.2007**

(87) International publication number:
WO 2009/072214 (11.06.2009 Gazette 2009/24)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(72) Inventor: **TOKURA, Sakurako**
Tokyo 100-8310 (JP)

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

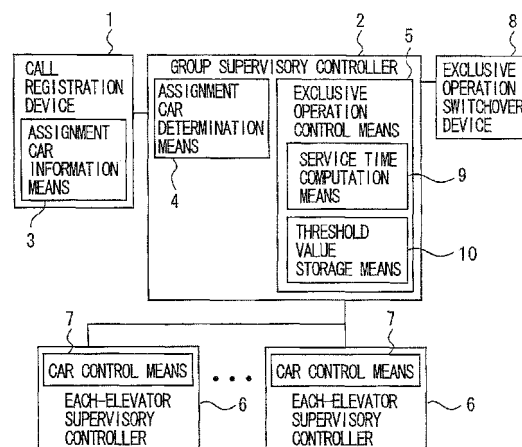
(71) Applicant: **Mitsubishi Electric Corporation**
Tokyo 100-8310 (JP)

(54) **ELEVATOR SYSTEM**

(57) In an elevator system which enables a subset of a plurality of elevators under group supervisory control to be switched to exclusive operations, it becomes possible to prevent a decrease in the operation efficiency of the whole system and to perform switchovers to exclusive operations quickly. For this purpose, the elevator system is provided with a call registration device with which an elevator user registers his or her destination floor before getting in a car and an exclusive operation switchover device which sends a switchover request in order to

switch a subset of the plurality of elevators to exclusive operations. Upon receipt of the switchover request from the exclusive operation switchover device, service time for destination calls which have already been registered by the call registration device is computed regarding the subset of the elevators. On the basis of the computed service time, services for some of the destination calls is performed in a range not exceeding a prescribed threshold value and switching the subset of the elevators to exclusive operations is performed without performing services for the remaining destination calls.

Fig. 1



Description

Technical Field

[0001] The present invention relates to an elevator system which performs group supervisory control of a plurality of elevators and can switch a subset of the elevators to exclusive operations.

Background Art

[0002] In a building and the like where there are many elevator users, a plurality of elevators are installed within the same building and group supervisory control of the plurality of elevators is performed to improve the overall efficiency of operation. Some of such elevators are configured in such a manner that a subset of the elevators under group supervisory control are capable of being switched to exclusive operations. Examples of exclusive operations include a VIP (very important person) operation dedicated to VIPs, and a baggage operation for conveying large baggage and the like.

[0003] Conventional arts for such elevator systems include the elevator system described in Patent Document 1 below. In this elevator system, an elevator hall is provided with a call registration device with which users register their destination floors. And when an operation for a switchover of a nonstop floor (a switchover to an exclusive operation) is performed during an ordinary operation, all services for the destination calls which have already been registered by the above-described call registration device are carried out before a switchover to an exclusive operation is actually performed.

[0004] Patent Document 1: Japanese Patent Laid-Open No. 2004-18229

Disclosure of the Invention

Problems to be Solved by the Invention

[0005] The elevator system described in Patent Document 1 had the problem that a delay occurs in a switchover to an exclusive operation. That is, even when a switchover to an exclusive operation for VIPs and other persons has been performed, it is after all users who have registered their destination calls are conveyed to designated floors that the exclusive operation is actually started. Particularly, in buildings where the number of elevator users is large and in prescribed time zones, a long time passes before a switchover to an exclusive operation, with the result that VIPs and other persons had to wait for a long time.

[0006] The present invention has been made to solve problems as described above and the object of the invention is to ensure that in an elevator system which enables a subset of a plurality of elevators under group supervisory control to be switched to exclusive operations, a decrease in the operation efficiency of the whole

system can be prevented and switchovers to exclusive operations can be performed quickly.

Means for Solving the Problems

[0007] An elevator system of the present invention is an elevator system that performs group supervisory control of a plurality of elevators, which comprises a call registration device with which an elevator user registers his or her destination floor before getting in a car, an exclusive operation switchover device which sends a switchover request in order to switch a subset of the plurality of elevators to exclusive operations, computation means which computes service time for destination calls which have already been registered by the call registration device regarding the subset of the elevators upon receipt of the switchover request from the exclusive operation switchover device, and exclusive operation control means which performs services for some of the destination calls in a range not exceeding a prescribed threshold value on the basis of service time computed by the computation means and switches the subset of the elevators to exclusive operations without performing services for the remaining destination calls.

Effect of the Invention

[0008] According to the present invention, in an elevator system which enables a subset of a plurality of elevators under group supervisory control to be switched to exclusive operations, it becomes possible to prevent a decrease in the operation efficiency of the whole system and to perform switchovers to exclusive operations quickly.

Brief of Description of the Drawings

[0009]

Figure 1 is a block diagram showing an elevator system in a first embodiment according to the present invention.

Figure 2 is a flowchart showing the operation of the elevator system in a first embodiment according to the present invention.

Description of symbols

[0010]

- 1 call registration device,
- 2 group supervisory controller,
- 3 assignment car information means,
- 4 assignment car determination means,
- 5 exclusive operation control means,
- 6 each-elevator supervisory controller,
- 7 car control means,
- 8 exclusive operation switchover device,

- 9 service time computation means,
10 threshold value storage means

Best Mode for Carrying Out the Invention

[0011] The present invention will be described in more detail with reference to the accompanying drawings. Incidentally, in each of the drawings, like numerals refer to like or similar parts and overlaps of description of these parts are appropriately simplified or omitted.

First Embodiment

[0012] Figure 1 is a block diagram showing an elevator system in a first embodiment according to the present invention. In the elevator system shown in Figure 1, a plurality of elevators installed within the same building are brought under group supervisory control and furthermore a subset of the elevators (one or more elevators) can be switched to exclusive operations, such as a VIP operation and a baggage operation.

[0013] In Figure 1, reference numeral 1 denotes a call registration device for registering destination floors of the elevator. When a destination floor has been registered by an elevator user, this call registration device 1 sends a destination call registration request for registering a destination call to a group supervisory controller 2. The call registration device 1 is provided with assignment car information means 3 which informs users nearby of a car assigned to the destination call registration request (hereinafter, referred to also as an "assignment car").

[0014] The above-described call registration device 1 is installed in each hall of the elevator, for example, and is provided with input buttons with which users register their destination floors before they get in the car, and a display or a speaker for informing elevator users nearby of an assignment car. Incidentally, this configuration shows only one example and the call registration device 1 may be otherwise configured. For example, the call registration device 1 may be a mobile terminal carried by an elevator user, which permits radio communication with the group supervisory controller 2. A cellular phone, a PHS (Personal Handyphone System), a PDA (Personal Digital Assistance), a notebook-size personal computer and the like can be used as the above-described mobile terminal.

[0015] The call registration device 1 may be such that the device has a function of personal ID collating function and personal ID data as a function for registering destination floors and that when a user collates a personal ID, the device refers to the personal ID data and automatically discriminates a destination floor. In this case, a destination call registration request corresponding to the destination floor stored in the personal ID data is automatically sent to the group supervisory controller 2. Incidentally, the collation of a personal ID by a user is performed on the basis of, for example, a key, a card an IC tag and the like in which a personal ID is recorded, and

biological information, such as a fingerprint, a vein, a voice print and an iris.

[0016] The group supervisory controller 2 is a device for group supervisory control of a plurality of elevators installed in the same building. The group supervisory controller 2 is provided with, for example, assignment car determination means 4 and exclusive operation control means 5.

[0017] The assignment car determination means 4 has a function of assigning a car on the basis of the operation condition of each elevator and the like to a received destination call registration request when the group supervisory controller 2 has received the destination call registration request. And after performing the assignment of a car to the destination call registration request, the assignment car determination means 4 sends destination call assignment instructions to an each-elevator supervisory controller 6 and sends assignment car information to the call registration device 1.

[0018] The each-elevator supervisory controller 6 performs the operation control of each elevator. The each-elevator supervisory controller 6 is provided with car control means 7 which performs the operation control of the car of each elevator. And upon receipt of the destination call assignment instructions from the assignment car determination means 4, the each-elevator supervisory controller 6 appropriately controls the operation of the car on the basis of the assigned destination call.

On the basis of the assignment car information received from the assignment car determination means 4, the assignment car information means 3 performs lamp display and announcement, thereby informing users nearby of information on the assignment car.

[0019] On the other hand, an exclusive operation switchover device 8 is intended for switching a subset of a plurality of elevators under group supervisory control to exclusive operations. When a prescribed operation (the input of a signal) and the like has been performed, this exclusive operation switchover device 8 sends an exclusive operation switchover request for switching the above-described subset of the elevators to the group supervisory controller 2.

[0020] The exclusive operation control means 5 has a function of shifting the above-described subset of the elevators to exclusive operations on the basis of the exclusive operation switchover request received from the exclusive operation switchover device 8. Concretely, this exclusive operation control means 5 is provided with service time computation means 9 and threshold value storage means 10. The service time computation means 9 has a function of computing time necessary for performing a service (hereinafter referred to as "service time") to a destination call which has already been registered by the call registration device 1. For example, upon receiving an exclusive operation switchover request, this service time computation means 9 computes service time for the destination calls which have already been registered before the receipt of the exclusive oper-

ation switchover request regarding the subset of the elevators to be shifted to exclusive operations.

[0021] A prescribed threshold value is stored in the threshold value storage means 10. On the basis of service time computed by the service time computation means 9, the exclusive operation control means 5 performs services to the destination calls which have already been registered in a range not exceeding the above-described prescribed threshold value and thereafter shifts the subset of the elevators to exclusive operations. For example, when services to all destination calls that have already been registered are completed in the range of the threshold value stored in the threshold value storage means 10, the exclusive operation control means 5 performs all of the services and thereafter makes a shift to exclusive operations. When the services to all of the destination calls that have already been registered are not completed in a range not exceeding the above-described prescribed threshold value, the exclusive operation control means 5 performs only services to some of the destination calls and makes a shift: to exclusive operations without performing services to the remaining destination calls.

[0022] Incidentally, the call registration device 1, group supervisory controller 2 and each-elevator supervisory controller 6 are each connected by a network and are configured to be able to mutually perform information communication.

[0023] Next, on the basis of Figure 2, a description will be given of an example of a concrete operation of an elevator system having the above-described configuration. Figure 2 is a flowchart showing the operation of the elevator system in a first embodiment according to the present invention.

[0024] When an elevator user has registered his or her own destination floor before getting in a car with the call registration device 1, a destination call registration request is sent from the call registration device 1 to the group supervisory controller 2 (S1). Upon receipt of the destination call registration request (S2), the group supervisory controller 2 determines an assignment car for the received destination call registration request by using the assignment car determination means 4. After the determination of the assignment car, the group supervisory controller 2 sends instructions for the assignment to the destination call to the each-elevator supervisory controller 6 and sends assignment car information to the call registration device 1 (S3).

[0025] Upon receipt of the assignment car information (S4), the call registration device 1 informs users nearby of information on the assignment car with the assignment car information means 3 (S5). The each-elevator supervisory controller 6 which has received the instructions for the assignment to the destination call controls the car on the basis of the received destination call and conveys the user to the destination floor.

[0026] The above-described operation is performed for one destination call. In actuality, however, many per-

sons use the elevator and hence many destination call registration requests are sent to the group supervisory controller 2 from call registration devices 1 installed in each hall and the like. In such a situation, a plurality of destination calls are assigned to each elevator by the assignment car determination means 4. Therefore, the each-elevator supervisory controller 6 sequentially performs services to the registered destination calls on the basis of a prescribed order and the like and conveys users to the destination floors.

[0027] On the other hand, when VIPs and other persons use an elevator, an exclusive operation switchover request is sent from the exclusive operation switchover device 8 regardless of the operation condition of the elevator (S6). Upon receipt of the exclusive operation switchover request (S7), first, the group supervisory controller 2 selects an elevator for which a switchover to an exclusive operation is performed on the basis of prescribed settings, conditions and the like. And service time for destination calls which have already been registered at the time of receipt of the exclusive operation switchover request is computed by using the service time computation means 9 regarding the above-described selected elevator (hereinafter referred to as the "selected elevator") (S8).

[0028] The exclusive operation control means 5 compares the service time computed at S8 with the prescribed threshold value stored in the threshold value storage means 10, and cancels destination calls for which the service completion time exceeds the threshold value, among the destination calls assigned to the car of the selected elevator (S9). Incidentally, at S9, when a car has not yet arrived at the departure floor for the destination calls to be cancelled, a change of the assignment of destination calls may be made.

[0029] After that, the exclusive operation control means 5 makes a judgment as to whether or not there are destination calls for which the service completion time does not exceed the threshold value, among the destination calls assigned to the car of the selected elevator (S10). When at S10 there is a destination call for which the service completion time does not exceed the threshold value, the exclusive operation switchover request is put on hold until the service for the destination call is completed (S11) and after the completion of the above-described service, instructions for exclusive operation execution are sent to the each-elevator supervisory controller 6 of the selected elevator (S12). Incidentally, when at S10 there is no destination call for which the service completion time does not exceed the threshold value, the flow of processing shifts to S12 immediately and instructions for exclusive operation execution are outputted.

And upon receipt of the instructions for exclusive operation execution (S13), the each-elevator supervisory controller 6 starts an exclusive operation (S14).

[0030] According to the first embodiment of the present invention, in an elevator system which enables

a subset of a plurality of elevators under group supervisory control to be switched to exclusive operations, it becomes possible to prevent a decrease in the operation efficiency of the whole system and to perform switchovers to exclusive operations quickly.

[0031] That is, upon receipt of an exclusive operation switchover request, the group supervisory controller 2 performs services to destination calls which have already been registered in a range not exceeding a prescribed threshold value regarding an elevator which is to be shifted to an exclusive operation and does not perform services to other destination calls. Therefore, it is possible to adjust the time until the start of an exclusive operation by the above-described threshold value, and it is possible to positively prevent situations in which VIPs and other persons wait for a long time. Furthermore, because even upon receipt of an exclusive operation switchover request, services to destination calls which have already been registered are performed in a range not exceeding a prescribed threshold value regarding an elevator which is to be shifted to an exclusive operation, an extreme decrease in the operation efficiency of the whole system does not occur and it is possible to maintain efficient operations.

[0032] Incidentally, for services to be performed after the receipt of an exclusive operation switchover request and before a switchover to an exclusive operation, various kinds of determination methods are conceivable. For example, in consideration of the order of registration of destination calls, services for destination calls may be performed in the order of earlier to later ones, or it may be ensured that services for destination calls can be performed as many as possible. Services to be performed may be determined by giving some order of priority to destination calls, and services for car calls may be preferentially performed. At this time, among destination calls in which a threshold value is exceeded, for car calls which have already been registered, canceling is performed and for hall calls which have already been registered, the assignment to other elevators is changed or canceling is performed.

[0033] In the first embodiment, services to be performed before switchovers to exclusive operations are judged on the basis of the time necessary for performing services for destination calls which have already been registered. However, a judgment may be made by considering also the movement time until arrival at a floor at which an exclusive operation is started in addition to the above-described time.

In this case, the exclusive operation control means 5 performs services for some of the destination calls which have already been registered in a range not exceeding the prescribed threshold value and the movement to a floor at which an exclusive operation is started, and thereafter switches a subset of the elevators to exclusive operations. According to such a configuration, it becomes possible to positively prevent the start of an exclusive operation from delaying.

[0034] Incidentally, because there are also various kinds of exclusive operations, it is possible to appropriately adjust the switchover time to an exclusive operation by changing the above-described prescribed threshold value for each kind of exclusive operation. Concretely, the exclusive operation switchover device 8 is configured to send a switchover request which differs from one kind of exclusive operation to another. And a threshold value is individually set for each kind of switchover request and is caused to be stored in the threshold value storage means 10.

Also, for a similar reason, the switchover time to an exclusive operation may be adjusted for each user of exclusive operation, i.e., for each class or each priority of a user. In this case, the exclusive operation switchover device 8 is configured to send a switchover request which differs from one user of exclusive operation to another. And a threshold value is individually set for each switchover request and is caused to be stored in the threshold value storage means 10.

[0035] The switchover time to an exclusive operation may be capable of being appropriately adjusted according to the degree of crowdedness of an elevator (for example, the number of passengers getting in and off and the number of calls). In this case, judgment means which judges the degree of crowdedness of elevators in group supervisory control becomes further necessary. And the above-described prescribed threshold value is individually set on the basis of the degree of crowdedness judged by this judgment means. If such a configuration is adopted, it becomes possible to positively prevent a decrease in the operation efficiency of the whole system.

Incidentally, a threshold value may also be set by a plurality of combinations of the above-described elements (kinds of exclusive operations, users of exclusive operation, the degree of crowdedness of elevators). According to such a configuration, it is possible to flexibly adapt to various kinds of elevators.

40 Industrial Applicability

[0036] The elevator system related to the present invention can be applied to an elevator system which performs group supervisory control of a plurality of elevators and can switch a subset of the elevators to exclusive operations. When there are many elevator users, this elevator system provides especially effective means.

50 Claims

1. An elevator system which performs group supervisory control of a plurality of elevators, comprising:

a call registration device with which an elevator user registers his or her destination floor before getting in a car;
an exclusive operation switchover device which

sends a switchover request in order to switch a subset of the plurality of elevators to exclusive operations;

computation means which computes service time for destination calls which have already been registered by the call registration device regarding the subset of the elevators upon receipt of the switchover request from the exclusive operation switchover device; and
exclusive operation control means which performs services for some of the destination calls in a range not exceeding a prescribed threshold value on the basis of service time computed by the computation means and switches the subset of the elevators to exclusive operations without performing services for the remaining destination calls.

2. The elevator system according to claim 1, wherein the exclusive operation control means performs services for some of the destination calls which have already been registered and movement to a floor at which an exclusive operation is to be started in a range not exceeding the prescribed threshold value on the basis of service time computed by the computation means and movement time to the floor at which an exclusive operation is to be started, and switches the subset of the elevators to exclusive operations without performing services for the remaining destination calls.
3. The elevator system according to claim 1 or 2, wherein the exclusive operation control means also performs services for the remaining destination calls which have already been registered before switching a subset of the elevators to exclusive operations in a case where services for the remaining destination calls are completed in a range not exceeding the prescribed threshold value.
4. The elevator system according to any one of claims 1 to 3, wherein the exclusive operation switchover device sends a switchover request which differs from one kind of exclusive operation to another; and the prescribed threshold value is individually set for each switchover request.
5. The elevator system according to any one of claims 1 to 3, wherein the exclusive operation switchover device sends a switchover request which differs from one user of exclusive operation to another; and the prescribed threshold value is individually set for each switchover request.
6. The elevator system according to any one of claims 1 to 3, wherein

the elevator system further comprises judgment means which judges the degree of crowdedness of the elevators under group supervisory control; and the prescribed threshold value is individually set on the basis of crowdedness judged by the judgment means.

7. The elevator system according to any one of claims 1 to 3, wherein the prescribed threshold value is individually set on the basis of at least two combinations of kinds of exclusive operations, users of exclusive operation and the degree of crowdedness of the elevators under group supervisory control.

Fig. 1

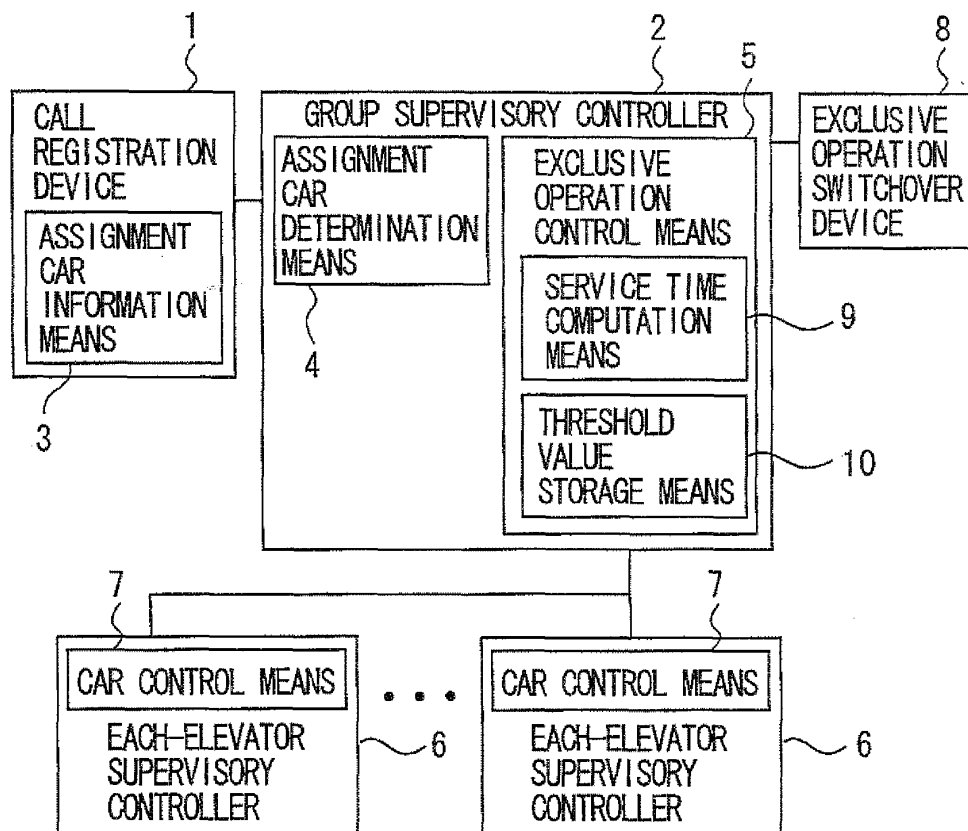
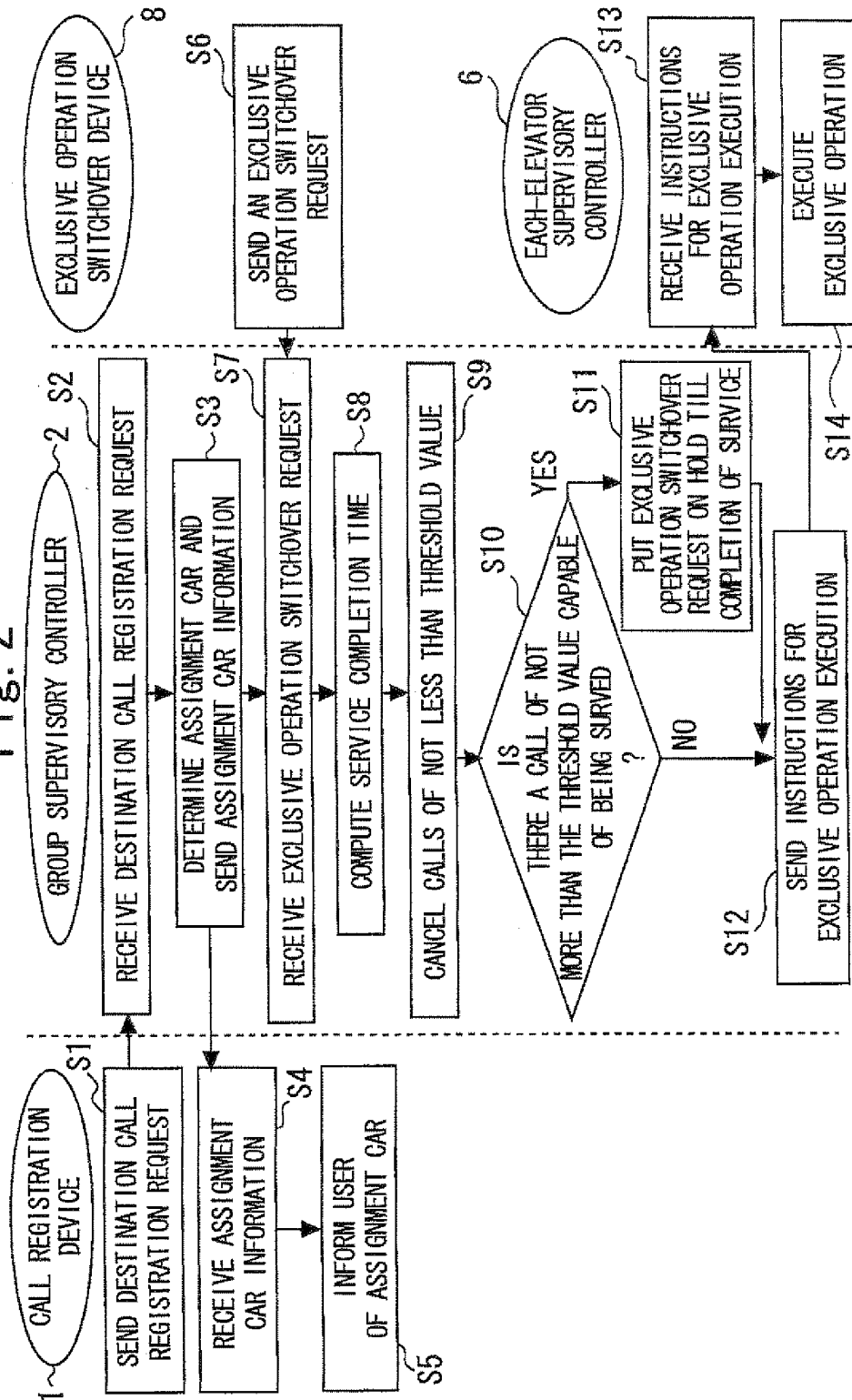


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2007/073717

A. CLASSIFICATION OF SUBJECT MATTER B66B1/18 (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) B66B1/18		
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 1996-2008 Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008		
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.
X Y A	JP 06-199481 A (Hitachi, Ltd.), 19 July, 1994 (19.07.94), Claim 2; Par. Nos. [0006], [0014], [0033] to [0039] (Family: none)	1-3 4-5, 7 6
Y	JP 62-285882 A (Hitachi, Ltd.), 11 December, 1987 (11.12.87), Claim 1 (Family: none)	4, 7
Y	JP 01-075376 A (Hitachi, Ltd.), 22 March, 1989 (22.03.89), Claim 1; page 2, lower left column, lines 8 to 14 (Family: none)	5, 7
☒ 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 20 August, 2008 (20.08.08)		Date of mailing of the international search report 02 September, 2008 (02.09.08)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2007/073717

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 10-053377 A (Toshiba Corp.), 24 February, 1998 (24.02.98), Abstract (Family: none)	6

Form PCT/ISA/210 (continuation of second sheet) (April 2007)

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 2004018229 A [0004]