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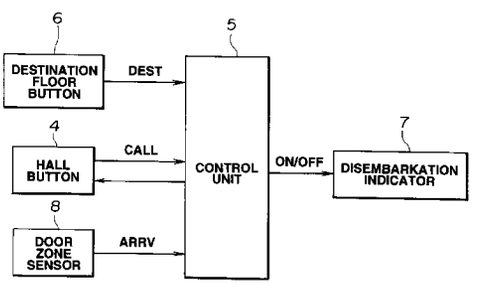
(54) Indicator system and method for elevators.

(57) A disembarkation indicator system and method for an elevator operates such that, when a hall button (4) for calling an elevator car to a particular floor is on the same floor as the floor which has been selected as a destination floor by a passenger within the elevator car, a disembarkation indicator (7) on the floor at which the hall button has been pressed is turned on for informing passengers waiting to board the elevator car that other passengers will be disembarking. Thus the flow of passenger traffic in and out of the elevator car may be smoothed and passenger convenience enhanced.

FIG.1



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The present invention relates generally to an indicator system and method for an elevator.

In conventional elevator systems commonly installed in office buildings, apartments, etc., each floor of the building is provided with a hall button for calling the elevator car to a floor on which the hall button has been pressed. When the elevator car arrives at the designated floor, the elevator car stops and the doors thereof open for taking on passengers.

However, in a building there are various floors at which boarded passengers may wish to disembark the elevator car while other passengers may wish to board at the same floor. Thus it may occur that boarding passengers may attempt to get into the elevator car before disembarking passengers have gotten out. This presents inconvenience and possible injury to elevator users and impedes smooth flow of elevator service.

It is a principal object of the present invention to overcome the drawbacks of the prior art.

In order to accomplish the aforementioned and other objects, a disembarkation indication method for an elevator is provided, comprising the steps of: calling an elevator car to a particular floor by pressing a hall button on the floor; comparing the floor number of the floor with floor numbers of floors selected as destination floors, the destination floors being selected by passengers within the elevator car by depressing a destination floor button within the elevator car; turning ON a disembarkation indicator on the floor when the floor number of the floor coincides with a selected destination floor; monitoring the floor for determining whether or not the elevator car has arrived at the floor; and turning OFF the disembarkation indicator when the elevator car arrives at the floor on which the hall button has been pressed and which has also been selected as a destination floor.

According to another aspect of the invention, a disembarkation indicator system for an elevator is provided, comprising: a hall button provided on a floor serviced by an elevator car, the hall button outputting a call signal indicative of the floor upon depression thereof; a destination floor button provided inside the elevator car, depression of the destination floor button outputting a destination signal indicative of a selected floor upon depression thereof; a sensor provided on a floor on which the hall button is provided for outputting an arrival signal indicative of elevator arrival at the floor (preferably a door zone sensor outputting a signal indicative of elevator door opening); a disembarkation indicator provided on the floor and responsive to ON and OFF signals to be turned on or off; and a control unit receivable of the call, destination and arrival signals and operable to stop the elevator car at the floor if the call signal has been received and at a floor selected by depression of the destination button, and further operable so as to output an ON signal to the disembarkation indicator when the destination signal corresponds to the floor if the call signal has been received and to output an OFF signal to the disembarkation indicator upon receiving the arrival signal.

According to still another aspect of the invention, a disembarkation indicator system for an elevator is provided, comprising: a plurality of hall buttons, one hall button respectively provided on each floor serviced by an elevator car, each of the hall buttons outputting a call signal indicative of the respective floor on which the hall button is located, upon depression thereof; a plurality of destination floor buttons provided inside the elevator car, each of the destination buttons respectively indicative of one of the floors serviced by the elevator car, depression of one of the destination buttons causing a destination signal, indicative of a floor corresponding to the destination button, to be output upon depression thereof; a plurality of sensors provided on the floors serviced by the elevator car, each of the sensors outputting an arrival signal indicative of its corresponding floor upon elevator arrival at the floor (preferably door zone sensors outputting signals indicative of elevator door opening); a plurality of disembarkation indicators provided on said floors serviced by the elevator car and respectively responsive to ON and OFF signals to be turned on or off; and a control unit receivable of the call, destination and arrival signals and operable to stop the elevator car at each floor from which a call signal has been received and at each floor selected by depression of one of the destination buttons, and further operable, when a floor for which a destination signal has been received corresponds to a floor from which a call signal has been received, to output an ON signal to the disembarkation indicator provided on the floor and, when an arrival signal is received from the floor, to output an OFF signal to the disembarkation indicator provided on the floor.

Thus, the present invention provides an elevator system in which passengers waiting to board an elevator car are informed if there are other passengers waiting to disembark at the same floor.

The present invention provides a disembarkation indicator system and method, for signaling waiting passengers that other passengers will disembark at the floor on which they are waiting, and so promotes smooth boarding and disembarkation of the elevator car.

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a block diagram showing the components of a disembarkation indicator system for an elevator according to an embodiment of the present invention;

Fig. 2 is a front view of a hall button panel and a door for boarding and/or disembarking an elevator car; and

Fig. 3 is a flowchart of a program executed for controlling the disembarkation indicator system according to the method of the present invention.

Referring to Fig. 2, it may be seen that the elevator disembarkation indicator system according to the present embodiment comprises a door 1, provided respectively at each floor serviced by the elevator for boarding and disembarking an elevator car (not shown). To the left of the door 1 in the drawing an arrival indicator panel 2 is provided. The arrival indicator panel 2 includes numerical indicators 3 for each floor to indicate the present position of the elevator car (not shown). The numerical indicators may be backlit by a pilot light for example in a per se known fashion. Like the door 1, the arrival indicator panel 2 may be provided on each floor serviced by the elevator.

Below the arrival indicator panel a hall button 4 is provided. The hall button 4 comprises an UP button 4a and a DOWN button 4b for allowing a passenger wishing to board the elevator car to indicate whether his/her destination floor is higher or lower than the present floor and to stop the elevator car when it is traveling in the appropriate direction. Referring to Fig. 1, when the UP button 4a or the down button 4b of the hall button 4 is pushed, a CALL signal representative of a floor on which the hall button is located is output to the control unit 5 of the elevator disembarkation indicator system. Like the door 1 and the arrival indicator panel 2, the hall button 4 may be provided on each floor serviced by the elevator.

Within the elevator car (not shown) a plurality of destination floor buttons 6 are provided. When one of the floor buttons 6 is depressed, a DEST (destination) signal indicative of the selected floor is output to the control unit 5 and the control unit 5 is then active to operate the elevator car to go to the selected destination floor.

Referring again to Fig. 2, according to the present embodiment, a 'PASSENGERS DISEMBARKING' indicator light 7 (hereinbelow: disembarkation indicator 7) is provided between the arrival indicator panel 2 and the hall button 4. The disembarkation indicator 7 may be comprised of a transparent, or translucent, panel 7a backed by a pilot light, which may be a light emitting diode (LED) such as a semiconductor chip or the like mounted in a metallic lead frame encased in synthetic resin, for example.

When a DEST signal is received at the control unit 5 which corresponds to a floor for which a CALL signal has been received, the control unit is active to switch the disembarkation indicator 7 ON at the appropriate floor.

Further, the system of the invention includes a door zone sensor 8 provided at each floor serviced by the elevator for determining when the elevator car has reached a selected destination floor. That is to say, when the elevator car stops at a floor which has been designated by a passenger pushing one of the destination floor buttons 6, the door zone sensor is active to output an ARRV (arrival) signal to the control unit 5 when the elevator car stops at that floor. When the ARRV signal received by the control unit 5 corresponds to a floor for which a CALL and DEST have been received, that is, when the ARRV signal is received from the floor on which the disembarkation indicator has been turned ON, the control unit 5 is active to switch the disembarkation indicator 7 OFF.

It will be noted that the above arrangement may be suitably utilized in elevator systems having more than one elevator car. According to this, whereas, at each floor, a single call button 4 is applicable to call one of a plurality of elevator cars, separate disembarkation indicators 7 are respectively provided for each of the elevator cars in the system, at cach floor. Accordingly, a plurality of doors 1 and a plurality of door zone sensors 8 must also be provided at each floor. In other respects, the system is operable identically to the above described arrangement.

Hereinbelow, a simplified explanation of a program executed by the control unit 5 for operating the elevator disembarkation indicator system according to the method of the invention will be described with reference to the flowchart of Fig. 3.

First, at a step S1, when a passenger presses the hall button 4, the CALL signal is output to the control unit 5.

Then, at a step S2, it is determined if a destination button 6 in the elevator car has been pushed for the same floor from which the CALL signal was received in step S1.

If the answer is NO at step S2 the routine goes to end, however, if the answer is YES at step S2, the routine proceeds to step S3.

At step S3, the disembarkation indicator 7 of the floor on which the hall button was pressed is turned ON by the control unit 5.

At a step S4 it is determined whether the elevator car has arrived at the designated floor for which the hall button 4 and the destination button 6 in the elevator car (not shown) have been pressed. That is, the control unit 5 receives the ARRV signal from the door zone sensor 8 at the designated floor. If the answer is NO at step S4, this step is repeated until a YES determination is made and the routine proceeds to a step S5.

At step S5, after arrival of the elevator car at the designated floor, the disembarkation indicator 7 is turned OFF by the control unit 5 and the routine proceeds to END.

It will be noted that the present invention is not exclusively limited to the embodiments recited above and various modifications may be effected within the scope of the invention. For example, the present invention may be suitably implemented with or without the arrival indicator panel 2. Further, though the above embodiment teaches a single elevator car, the

system and method of the invention may be utilized for elevator systems in which a plurality of elevator cars are provided. Also, the system and method of the invention are effective even when a plurality of destination floors have been designated by waiting passengers pressing hall buttons on more than one floor and a plurality of destination floors have been selected for disembarkation by passengers on the elevator car.

Thus, according to the present invention, passengers waiting to board an elevator car are informed in advance that other passengers arc waiting to disembark at the same floor. According to this arrangement, smooth boarding and disembarking of the elevator car may be effected and smoother flow of elevator traffic resulting in an improved level of elevator service may be reliably obtained. Further, such improvements may be implemented with relatively simple components at low cost to the operator and/or elevator manufacturer.

While the present invention has been disclosed in terms of the preferred embodiment in order to facilitate better understanding thereof, it should be appreciated that the invention can be embodied in various ways without departing from the principle of the invention. Therefore, the invention should be understood to include all possible embodiments and modification to the shown embodiments which can be embodied without departing from the principle of the invention as set forth in the appended claims.

Claims

1. A disembarkation indicator method for an elevator, comprising the steps of:

   calling an elevator car to a particular floor by pressing a hall button on said floor;

   comparing the floor number of said floor with floor numbers of floors selected as destination floors, said destination floors being selected by passengers within said elevator car by depressing a destination floor button within said elevator car;

   turning ON a disembarkation indicator on said floor when the floor number of said floor coincides with a selected destination floor;

   monitoring said floor for determining whether or not said elevator car has arrived at said floor; and

   turning OFF said disembarkation indicator when said elevator car arrives as said floor on which said hall button has been pressed and which has also been selected as a destination floor.

2. A disembarkation indicator method as set forth in claim 1, wherein said monitoring step is accomplished by sensing opening of elevator doors on each floor and, when said elevator doors on said floor open, outputting a signal indicative thereof.

3. A disembarkation indicator system for an elevator, comprising:

   a hall button provided on a floor serviced by an elevator car, said hall button outputting a call signal indicative of said floor upon depression thereof;

   a destination floor button provided inside said elevator car, depression of said destination floor button outputting a destination signal indicative of a selected floor upon depression thereof;

   a sensor provided on a floor on which said hall button is provided for outputting an arrival signal indicative of elevator arrival at said floor;

   a disembarkation indicator provided on said floor and responsive to ON and OFF signals to be turned on or off; and

   a control unit receivable of said call, destination and arrival signals and operable to stop said elevator car at said floor if said call signal has been received and at a floor selected by depression of said destination button, and further operable so as to output an ON signal to said disembarkation indicator when said destination signal corresponds to said floor if said call signal has been received and to output an OFF signal to said disembarkation indicator upon receiving said arrival signal.

4. A disembarkation indicator system as set forth in claim 3, wherein said disembarkation indicator is provided proximate said hall button.

5. A disembarkation indicator system as set forth in claim 3 or 4, further including an arrival indicator provided on said floor for displaying a current location of said elevator car.

6. A disembarkation indicator system as set forth in claim 3, 4 or 5, wherein said hall button comprises a first button for calling said elevator car while moving in the up direction and a second button for calling said elevator car while moving in the down direction.

7. A disembarkation indicator system as set forth in any of claims 3 to 6, wherein said hall button and said sensor are respectively provided on a plurality of floors.

8. A disembarkation indicator system as set forth in any of claims 3 to 7, wherein a plurality of destination buttons are provided in said elevator car, one destination button respectively indicating one floor serviced by said elevator car.

9. A disembarkation indicator system for an elevator, comprising:

a plurality of hall buttons, one hall button respectively provided on each floor serviced by an elevator car, each said hall button outputting a call signal indicative of the respective floor on which said hall button is located, upon depression thereof;

a plurality of destination floor buttons provided inside said elevator car, each of said destination buttons respectively indicative of one said floors serviced by said elevator car, depression of one said destination floor button causing a destination signal, indicative of a floor corresponding to said destination button, to be output upon depression thereof;

a plurality of sensors provided on the floors serviced by said elevator car, each of said sensors outputting an arrival signal indicative of its corresponding floor upon arrival of said elevator at said floor;

a plurality of disembarkation indicators provided on said floors serviced by said elevator car and respectively responsive to ON and OFF signals to be turned on or off; and

a control unit receivable of said call, destination and arrival signals, and operable to stop said elevator car at each floor from which a call signal has been received and at each floor selected by depression of one of said destination buttons, and further operable, when a floor for which a destination signal has been received corresponds to a floor from which a call signal has been received, to output an ON signal to the disembarkation indicator provided on said floor and, when an arrival signal is received from said floor, to output an OFF signal to said disembarkation indicator provided on said floor.

10. A disembarkation indicator system as set forth in claim 9, wherein said disembarkation indicators are provided proximate said hall buttons at said respective floors.

11. A disembarkation indicator system as set forth in claim 9 or 10, further including a plurality of arrival indicators provided on each of said floors for displaying a current location of said elevator car.

12. A disembarkation indicator system as set forth in claim 9, 10 or 11, wherein each of said hall buttons comprises a first button for calling said elevator car while said elevator car moves in the up direction and a second button for calling said elevator car while said elevator car moves in the down direction.

13. A disembarkation indicator system as set forth in any of claims 9 to 12, wherein each of said call buttons is applicable to call one of a plurality of elevator cars, a separate disembarkation indicator being respectively provided for each of said elevator cars on each floor.

14. A disembarkation indicator system as set forth in any of claims 3 to 13, wherein said arrival signal is indicative of opening of elevator doors provided on said hall button floor(s).

FIG.1

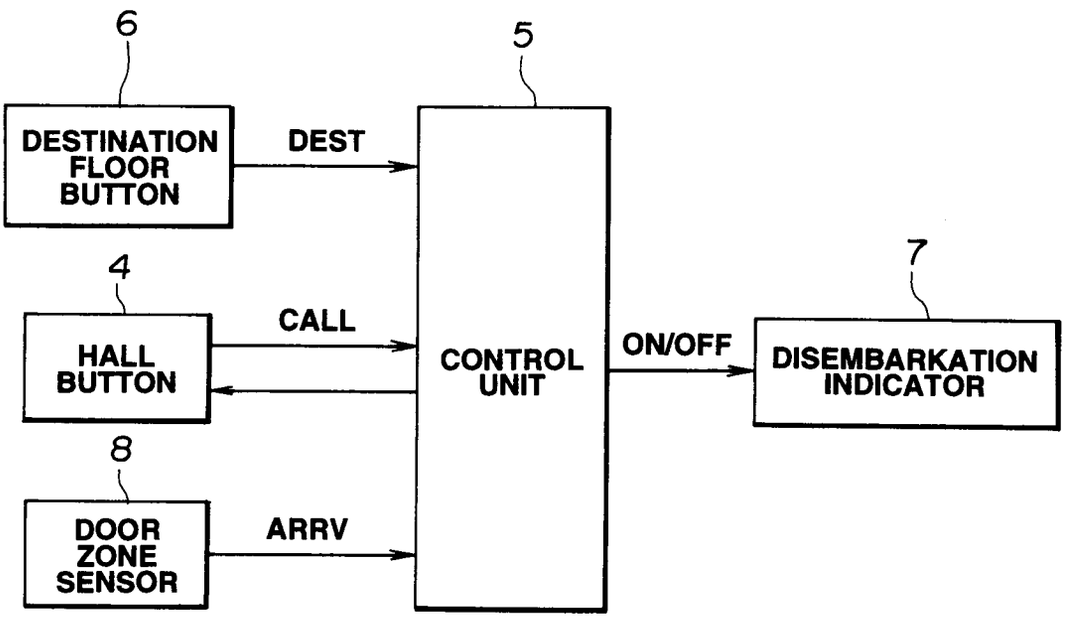

6
5
DESTINATION FLOOR BUTTON
DEST
4
7
HALL BUTTON
CALL
CONTROL UNIT
ON/OFF
DISEMBARKATION INDICATOR
8
DOOR ZONE SENSOR
ARRV

FIG.2

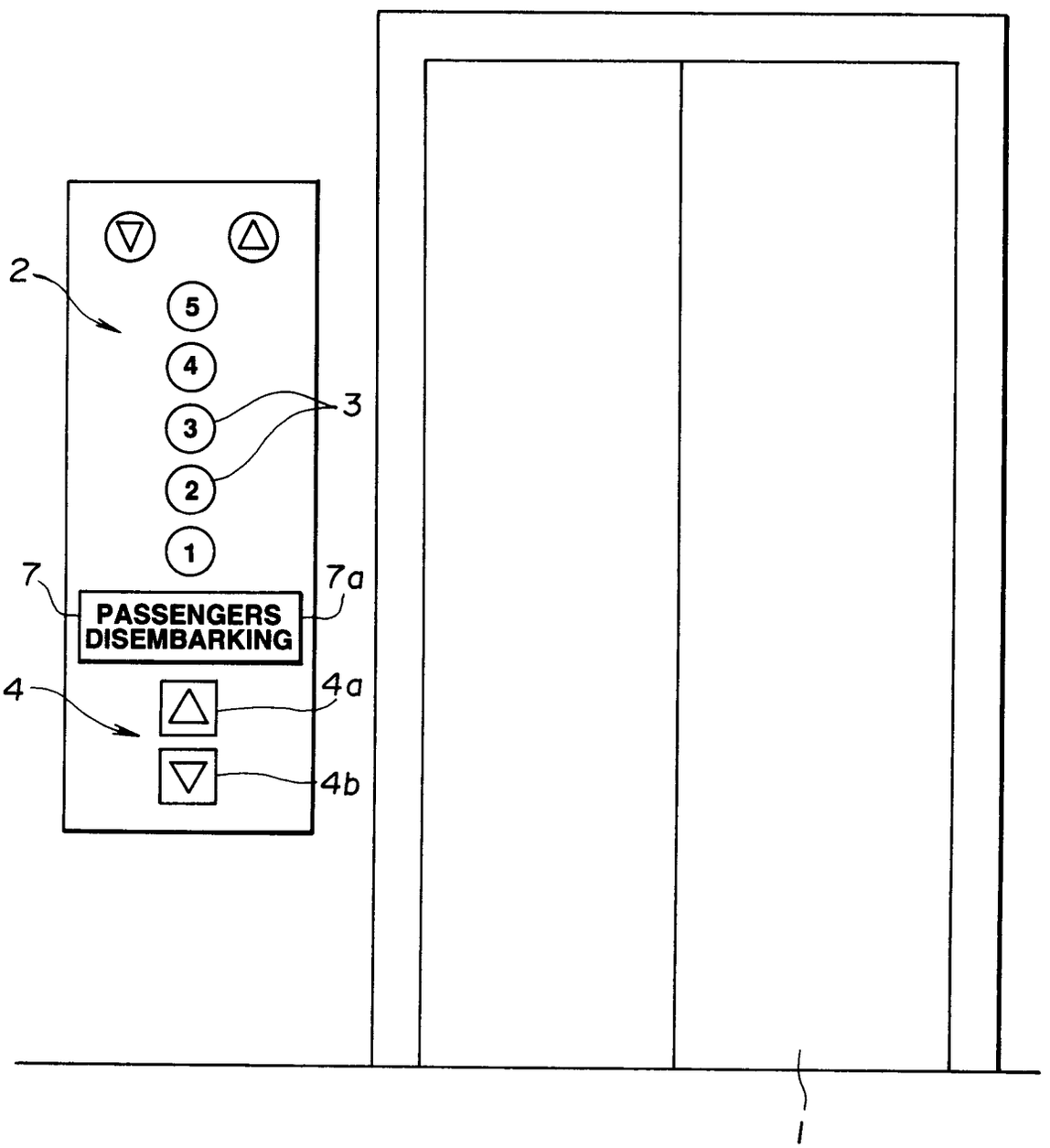
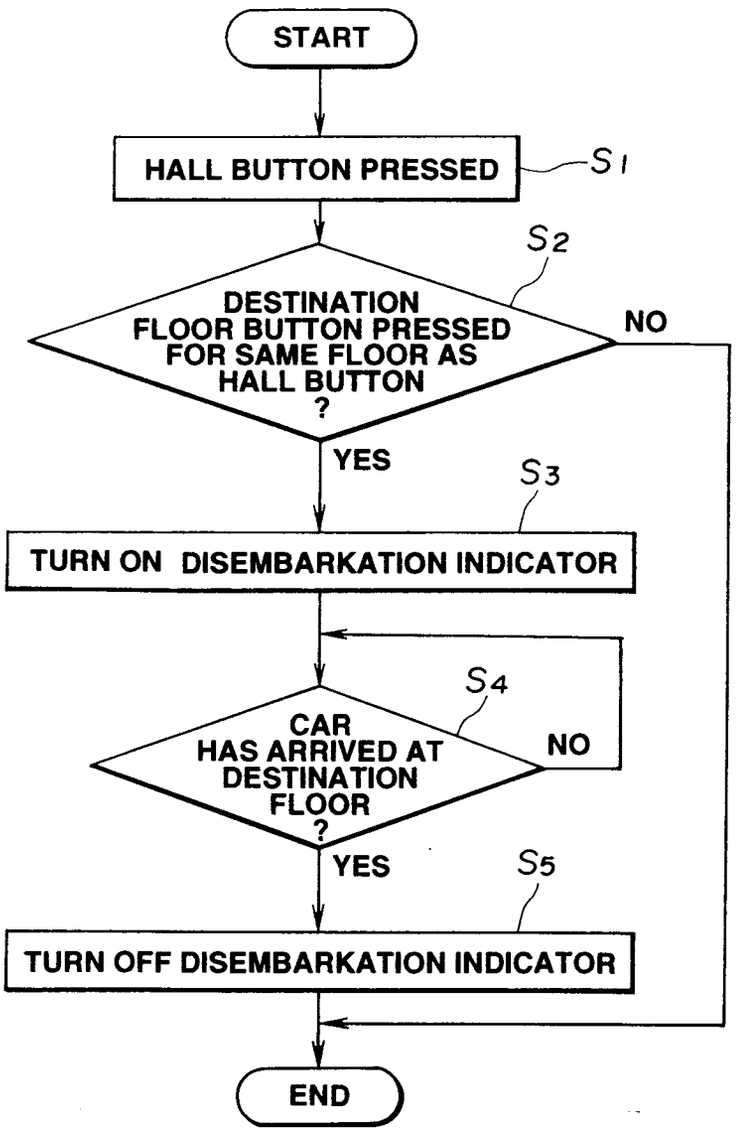


FIG.3


START
HALL BUTTON PRESSED
S1
S2
DESTINATION FLOOR BUTTON PRESSED FOR SAME FLOOR AS HALL BUTTON ?
NO
YES
S3
TURN ON DISEMBARKATION INDICATOR
S4
CAR HAS ARRIVED AT DESTINATION FLOOR ?
NO
YES
S5
TURN OFF DISEMBARKATION INDICATOR
END

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 6808

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US-A-2 730 693 (LERCH) * column 5, line 62 - column 6, line 37; figures 1-5 *	1,3,4, 6-10, 12-14	B66B3/00
Y	GB-A-2 203 568 (HITACHI LTD) * page 4, line 31 - page 5, line 2 * * page 5, line 36 - page 10, line 24; figures 3,4,7H *	1-14	
Y	GB-A-2 225 452 (HITACHI LTD) * page 22, line 16 - page 23, line 17 * * page 30, line 7 - page 31, line 12; figures 8-13 *	1-14	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5) B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 November 1993	CLEARY, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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P : intermediate document

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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