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(54) **ELEVATOR CONTROLLER**

AUFZUGSSTEUERUNG

CONTRÔLEUR D'ASCENSEUR

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(73) Proprietor: **Mitsubishi Electric Corporation**
Chiyoda-ku
Tokyo 100-8310 (JP)

(72) Inventors:

- **AMANO, Masaaki**
Chiyoda-ku
Tokyo 100-8310 (JP)

- **MOURI, Kazunari**
Chiyoda-ku
Tokyo 100-8310 (JP)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

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Description

Technical Field

[0001] The present invention relates to an elevator controller having a function of monitoring presence of an abnormality of a brake torque.

Background Art

[0002] In JP H01 247 383 A there is described a device for controlling an elevator. Here, a braking command is outputted from a sequence control means to a brake control circuit, thereby restricting the rotation of a cage driving motor by the action of a brake coil. If the rotation of the motor is detected by a counter, this is detected as a brake abnormality by a brake abnormality detecting means. According to the abnormality detection signal thereof, a motor control means controls the motor so as to generate braking torque by the motor itself instead of a brake device to make a cage travel to the final end floor, via a pulse width modulation circuit and an inverter. Thus, by rapidly coping with the brake abnormality, the safe operation of an elevator can be performed.

[0003] Further, in JP H08 40658 A there is described a control method and device for emergency brake of an elevator. An emergency brake control device for an elevator comprises a judgment means which takes in an abnormal signal from an abnormality detector means and judges whether or not an elevator should be stopped urgently, a story floor decision means which, based on the judgment, speed signals, car position signals, etc., determines the stoppable nearest story floor, and a brake instruction means which, based on the decision, speed signals, car position signals, etc., calculates braking timing and a degree of deceleration and outputs a braking instruction or a control means which outputs a braking force control instruction. Then, the brake instruction means, etc., output a door opening signal and a story floor signal.

[0004] In a further conventional elevator controller, when a rotation of a motor is detected by a speed detector at a time of detection of a brake command, it is judged that an abnormality occurs in a brake device. A brake torque is compensated for by the motor, whereas a car is operated to a terminal landing, for example, see Patent Document 1: Japanese Patent Application Laid-Open No. 1-247383.

Disclosure of the Invention

Problem to be solved by the Invention

[0005] In the conventional elevator controller as described above, however, the judgment of whether or not a door is allowed to be opened/closed at an occurrence of the abnormality in the brake device is not taken into consideration at all.

Moreover, a type of control to be performed when the abnormality is detected in the brake device in an event of emergency such as a fire or an earthquake is not considered either.

[0006] The present invention has been devised to solve the problem as described above, and has an object of obtaining an elevator controller capable of distinguishing normal times and an emergency from each other to perform more appropriate elevator control for an abnormality of a brake torque.

Means for solving the Problems

[0007] The elevator controller according to the present invention is defined by independent claim 1.

Brief Description of the Drawings

[0008]

[FIG. 1] FIG. 1 is a configuration diagram illustrating an elevator apparatus according to a first embodiment of the present invention.

[FIG. 2] FIG. 2 is a flowchart illustrating an operation of an elevator controller illustrated in FIG. 1 when a car stops.

Best Mode for carrying out the Invention

[0009] Hereinafter, a preferred embodiment of the present invention is described referring to the drawings.

First Embodiment

[0010] FIG. 1 is a configuration diagram illustrating an elevator apparatus according to a first embodiment of the present invention. In FIG. 1, a car 1 and a counterweight 2 are suspended by a main rope 3 in a hoistway, and are raised and lowered by a drive force of a hoisting machine 4. The hoisting machine 4 includes a driving sheave around which the main rope 3 is wound, a motor for rotating the driving sheave, and a brake device for braking the rotation of the driving sheave.

[0011] An operation of the car 1 is controlled by an elevator controller including a controller main body 5. Specifically, the motor and the brake device of the hoisting machine 4 are controlled by the elevator controller. The controller main body 5 is connected to a monitoring center 8 installed at a remote location through a notification device 6 and a general public network 7. In the event of occurrence of an abnormality in the elevator apparatus, the monitoring center 8 is notified of the abnormality from the controller main body 5 through the notification device 6 and the general public network 7.

[0012] The controller main body 5 includes travel control means 9, brake torque check means 10, emergency operation means 11, door opening/closing judgment means 12, terminal landing running means 13, and alarm

means 14.

[0013] The travel control means 9 controls the overall travel of the elevator apparatus. The brake torque check means 10 monitors, for example, a motor current value to monitor whether or not there is an abnormality in a brake torque of the brake device of the hoisting machine 4. The emergency operation means 11 selects and executes an emergency operation according to a detection signal for an emergency such as an earthquake or a fire. In the emergency operation, the car 1 is moved to stop at the nearest floor or a preset evacuation floor.

[0014] The door opening/closing judgment means 12 judges whether or not a door is allowed to be opened/closed when the car 1 stops at a stop floor. The terminal landing running means 13 causes the car 1 to run to the terminal landing to be stopped there. The alarm means 14 generates an abnormality detection signal, and outputs the generated abnormality detection signal to the notification device 6.

[0015] Here, the travel control means 9, the brake torque check means 10, the emergency operation means 11, the door opening/closing judgment means 12, the terminal landing running means 13, and the alarm means 14 are realized by software. Specifically, the controller main body 5 consists of a computer including a processing unit (CPU), a storage unit (a ROM, a RAM, a hard disk and the like) and a signal input/output unit. More specifically, functions of the controller main body 5 are realized by the computer. In the storage unit, programs for realizing the functions of the travel control means 9, the brake torque check means 10, the emergency operation means 11, the door opening/closing judgment means 12, the terminal landing running means 13, and the alarm means 14 are stored.

[0016] Next, an operation of the controller main body 5 is described. FIG. 2 is a flowchart illustrating an operation of the controller main body 5 illustrated in FIG. 1 when the car stops. The operation illustrated in FIG. 2 is started when the car 1 starts decelerating. When the car 1 is decelerated, the controller main body 5 monitors whether or not the car 1 has entered a door opening allowable zone (door zone) (Step S1). When the car 1 is in the door opening allowable zone, a door-opening operation is temporarily inhibited (Step S2) to monitor whether or not the car 1 has stopped (Step S3).

[0017] When the car 1 stops, it is confirmed whether or not there is the abnormality of the brake torque, specifically, whether or not the torque is lowered (Step S4). When the brake torque is normal, a car door and a landing door are opened (Step S5). Then, the processing is terminated. When the abnormality of the brake torque is detected, it is confirmed whether or not an emergency operation is selected (Step S6). If the emergency operation is selected, the car door and the landing door are opened (Step S5). Then, the processing is terminated.

[0018] On the other hand, if the emergency operation is not selected and a normal operation is being performed, the car 1 is caused to run to the terminal landing

(Step S7). When a load on the car 1 side is larger than that on the counterweight 2 side at this time, it is suitable to move the car 1 to a bottom terminal landing. When the load on the counterweight 2 side is larger than that on the car 1 side, it is suitable to move the car 1 to a top terminal landing.

[0019] When the running of the car 1 to the terminal landing is started, it is monitored whether or not the car 1 has entered the door opening allowable zone (Step S8). When the car 1 is in the door opening allowable zone, the door-opening operation is temporarily inhibited (Step S9) to monitor whether or not the car 1 has stopped (Step S10).

[0020] When the car 1 stops, it is confirmed again whether or not there is the abnormality of the brake torque (Step S11). If the abnormality of the brake torque is detected again, it is confirmed again whether or not the emergency operation is selected (Step S12).

[0021] If the brake torque has returned to normal and if the emergency operation is selected while the car 1 is running to the terminal landing although the abnormality of the brake torque is detected again, the car door and the landing door are opened and then closed after a predetermined period of time. Then, a light inside the car 1 is turned off (Step S13). After an alarm is issued to the monitoring center 8 (Step S14), the activation of the car 1 is continuously disabled until a maintenance person cancels the state of the disabled activation (Step S15). Then, the processing is terminated. However, if the car 1 is in the door opening allowable zone and a door open button inside the car 1 is operated, the car door and the landing door are opened for a predetermined period of time.

[0022] On the other hand, if the abnormality of the brake torque is still detected and the normal operation is being performed, the door is continuously inhibited from being opened (Step S16) and the alarm is issued to the monitoring center 8 (Step S17). A passenger is continuously trapped in the car 1 (Step S18). Then, the processing is terminated. In this state, until the maintenance person checks to verify the safety, the door is not opened in response to the operation of the door open button inside the car 1.

[0023] In the elevator controller as described above, if the abnormality of the brake torque is detected when the car 1 stops, it is judged whether or not the emergency operation is being performed. When the emergency operation is being performed, the door is allowed to be opened. When the normal operation is being performed, the door is inhibited from being opened. Therefore, in the event of emergency, the passenger is prevented from being trapped in the car 1, giving priority to evacuation. In normal times, the door close state is maintained to prevent the passenger from getting into and off the car 1 although the brake torque is still abnormal. Specifically, for the abnormality of the brake torque, the normal times and the emergency can be distinguished from each other to perform more appropriate elevator control.

[0024] Moreover, if the abnormality of the brake torque is detected when the car stops 1 and if the normal operation is being performed, the car 1 is moved to the terminal landing. Therefore, after stopping, the car 1 can be prevented from being moved a long distance due to the abnormality of the brake torque without any control.

[0025] Furthermore, if the brake torque returns to normal after the car 1 is moved to the terminal landing, the door is allowed to be opened and the alarm is issued to the monitoring center 8 while the activation of the car is disabled. Therefore, when the abnormality of the brake torque is detected even once, the operation of the elevator apparatus is stopped to quickly implement a check.

[0026] Furthermore, if the abnormality of the brake torque still continues after the car 1 is moved to the terminal landing, it is judged again whether or not the emergency operation is being performed. When the emergency operation is being performed, the door is allowed to be opened and the alarm is issued to the monitoring center 8 while the activation of the car 1 is disabled. Therefore, it is possible to cope with the case where the emergency occurs while the car 1 is being moved to the terminal landing.

[0027] Moreover, if the abnormality of the brake torque still continues after the car 1 is moved to the terminal landing, it is judged again whether or not the emergency operation is being performed. When the normal operation is being performed, the door is continuously inhibited from being opened and the alarm is issued to the monitoring center 8. Therefore, the passenger can be prevented from getting into and off the car 1 while the brake torque is still abnormal.

[0028] Although the functions of the travel control means 9, the brake torque check means 10, the emergency operation means 11, the door opening/closing judgment means 12, the terminal landing running means 13, and the alarm means 14 are executed by the single computer in the above-mentioned example, the functions may be executed by a plurality of devices in a distributed manner.

[0029] Moreover, various known methods can be used as the method of checking the brake torque, and therefore, the method of checking the brake torque is not particularly limited.

[0030] Furthermore, the present invention is applicable to an elevator apparatus including the hoisting machine and a control panel installed in a machine room provided in an upper part of the hoistway and to a machine-room-less elevator apparatus.

Claims

1. An elevator controller comprising a controller main body (5) for controlling an operation of a car (1) and for monitoring presence of an abnormality of a brake torque of a brake device for braking running of the car (1),

characterized in that

the controller main body (5) judges whether or not an emergency operation or a normal operation is being performed upon detection of the abnormality of the brake torque when the car (1) stops, and allows a door to be opened when the emergency operation is being performed and inhibits the door from being opened when the normal operation is being performed.

2. The elevator controller according to claim 1, wherein the controller main body (5) moves the car (1) to a terminal landing in a case where the abnormality of the brake torque is detected when the car (1) stops and the normal operation is being performed.
3. The elevator controller according to claim 2, wherein the controller main body (5) allows the door to be opened and issues an alarm to a monitoring center (8) while disabling activation of the car (1) when the brake torque returns to normal after the car (1) is moved to the terminal landing.
4. The elevator controller according to claim 2, wherein the controller main body (5) judges again whether or not the emergency operation is being performed when the abnormality of the brake torque still continues after the car (1) is moved to the terminal landing, and allows the door to be opened and issues an alarm to a monitoring center (8) while disabling activation of the car (1) when the emergency operation is being performed.
5. The elevator controller according to claim 2, wherein the controller main body (5) judges again whether or not the emergency operation is being performed when the abnormality of the brake torque still continues after the car (1) is moved to the terminal landing, and continues to inhibit the door from being opened and issues an alarm to a monitoring center (8) when the normal operation is being performed.

Patentansprüche

1. Aufzugssteuerung, umfassend einen Steuerungshauptkörper (5) zum Steuern eines Betriebs eines Fahrkorbs (1) und zum Überwachen eines Vorhandenseins einer Abnormität eines Bremsmoments einer Bremsvorrichtung zum Abbremsen eines Fahrens des Fahrkorbs (1),
dadurch gekennzeichnet, dass
der Steuerungshauptkörper (5) bei der Feststellung der Abnormität des Bremsmoments, wenn der Fahrkorb (1) anhält, einschätzt, ob ein Notbetrieb oder ein normaler Betrieb durchgeführt wird oder nicht, und gestattet, dass eine Tür geöffnet wird, wenn der Notbetrieb durchgeführt wird, und verhindert, dass

die Tür geöffnet wird, wenn der normale Betrieb durchgeführt wird.

2. Aufzugssteuerung nach Anspruch 1, wobei der Steuerungshauptkörper (5) in einem Fall, in dem die Abnormität des Bremsmoments festgestellt wird, wenn der Fahrkorb (1) anhält und der normale Betrieb durchgeführt wird, den Fahrkorb (1) zu einer Endzugangsstelle bewegt. 5
3. Aufzugssteuerung nach Anspruch 2, wobei der Steuerungshauptkörper (5) gestattet, dass die Tür geöffnet wird, und einen Alarm an ein Überwachungszentrum (8) ausgibt, während er den Fahrkorb (1) deaktiviert, wenn das Bremsmoment sich wieder normalisiert, nachdem der Fahrkorb (1) zu der Endzugangsstelle bewegt wird. 10
4. Aufzugssteuerung nach Anspruch 2, wobei der Steuerungshauptkörper (5) erneut einschätzt, ob der Notbetrieb durchgeführt wird oder nicht, wenn die Abnormität des Bremsmoments weiter andauert, nachdem der Fahrkorb (1) zu der Endzugangsstelle bewegt wird, und gestattet, dass die Tür geöffnet wird, und einen Alarm an ein Überwachungszentrum (8) ausgibt, während er den Fahrkorb (1) deaktiviert, wenn der Notbetrieb durchgeführt wird. 15 20 25
5. Aufzugssteuerung nach Anspruch 2, wobei der Steuerungshauptkörper (5) erneut einschätzt, ob der Notbetrieb durchgeführt wird oder nicht, wenn die Abnormität des Bremsmoments weiter andauert, nachdem der Fahrkorb (1) zu der Endzugangsstelle bewegt wird, und weiter verhindert, dass die Tür geöffnet wird, und einen Alarm an ein Überwachungszentrum (8) ausgibt, wenn der normale Betrieb durchgeführt wird. 30 35

Revendications

1. Contrôleur d'ascenseur comprenant un corps principal de contrôleur (5) permettant de contrôler le fonctionnement d'une cabine (1) et de surveiller la présence d'une anomalie d'un couple de frein d'un dispositif de frein destiné à freiner la course de la cabine (1), 40 45
caractérisé en ce que :
 - le corps principal de contrôleur (5) juge si un fonctionnement en mode d'urgence ou en mode normal est en cours ou non lors de la détection de l'anomalie du couple de frein lorsque la cabine (1) s'arrête et permet d'ouvrir une porte lorsque le fonctionnement en mode d'urgence est en cours et empêche l'ouverture de la porte lorsque le fonctionnement est en mode normal. 50 55

2. Contrôleur d'ascenseur selon la revendication 1, dans lequel le corps principal de contrôleur (5) déplace la cabine (1) vers un palier terminal au cas où l'anomalie du couple de frein est détectée lorsque la cabine (1) s'arrête et que le fonctionnement en mode normal est en cours.
3. Contrôleur d'ascenseur selon la revendication 2, dans lequel le corps principal de contrôleur (5) permet d'ouvrir la porte et délivre une alarme à destination d'un centre de surveillance (8) tout en invalidant l'activation de la cabine (1) lorsque le couple de frein revient à la normale une fois la cabine (1) déplacée vers le palier terminal.
4. Contrôleur d'ascenseur selon la revendication 2, dans lequel le corps principal de contrôleur (5) juge à nouveau si le fonctionnement en mode d'urgence est en cours ou non lorsque l'anomalie du couple de frein persiste une fois la cabine (1) déplacée vers le palier terminal et permet d'ouvrir la porte et délivre une alarme à destination d'un centre de surveillance (8) tout en invalidant l'activation de la cabine (1) lorsque le fonctionnement en mode d'urgence est en cours.
5. Contrôleur d'ascenseur selon la revendication 2, dans lequel le corps principal de contrôleur (5) juge si le fonctionnement en mode d'urgence est en cours ou non lorsque l'anomalie du couple de frein persiste une fois la cabine (1) déplacée vers le palier terminal et continue d'empêcher l'ouverture de la porte et délivre une alarme à destination d'un centre de surveillance (8) lorsque le fonctionnement en mode normal est en cours.

FIG. 1

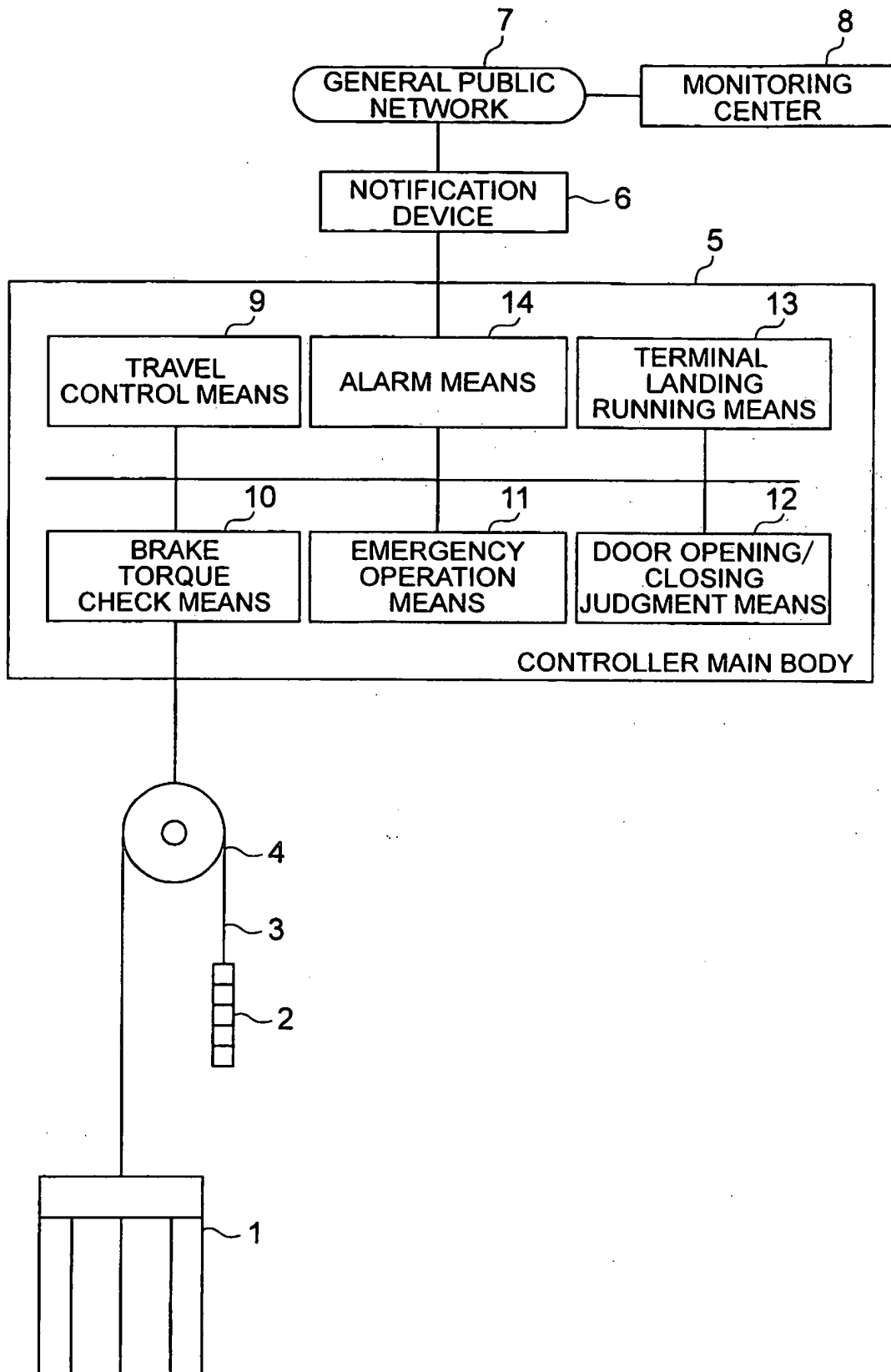
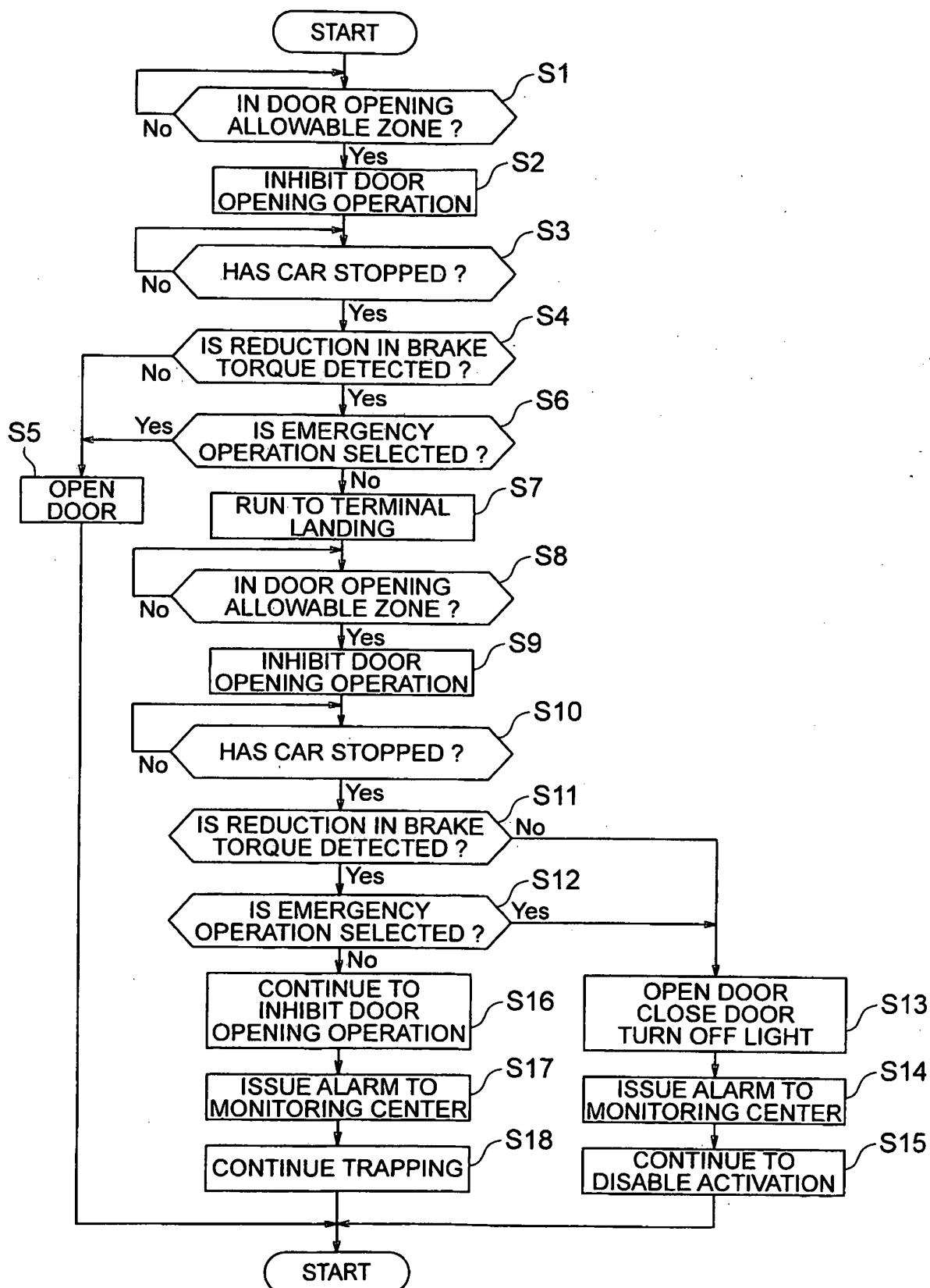


FIG. 2



REFERENCES CITED IN THE DESCRIPTION

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