the car wirelessly without using a travelling cable is desired.

Further, by transmitting a control signal called a hall call which is output in accordance with an operation on a hall call button installed in each hall on the floor wirelessly, wiring (a cable) or the like necessary for transmitting the control signal may be simplified.

SUMMARY

According to one aspect, there is provided a wireless transmission system comprising a plurality of wireless apparatuses corresponding to a plurality of components of an elevator, respectively, the plurality of components outputting signals used for controlling the elevator, each of the plurality of wireless apparatuses comprising:

a transmitter configured to transmit a first signal, which is output by a corresponding component, to other wireless apparatuses wirelessly;

a receiver configured to receive a second signal output by each of components corresponding to the other wireless apparatuses from each of the other wireless apparatuses wirelessly; and

a counter configured to maintain a value which is updated every time the first signal is transmitted or the second signal is received, wherein

the transmitter is configured to transmit the first signal when the value maintained by the counter agrees with a value determined in advance with respect to the wireless apparatus comprising the transmitter, and

values determined in advance with respect to the plurality of wireless apparatuses, respectively, are different from one another,

the transmitter comprised in a predetermined wireless apparatus of the plurality of wireless apparatuses is configured to transmit a third signal,

which is a substitute of the second signal, when the value maintained by the counter does not agree with a value determined in advance with respect to the predetermined wireless apparatus, and the second signal is not received for a certain period,

the plurality of components comprise an elevator control device configured to control at least ascending and descending operation of a car;

the predetermined wireless apparatus is a wireless apparatus corresponding to the elevator control device; and

the wireless apparatus corresponding to the elevator control device further comprises a notification module configured to notify the elevator control device that the second signal is not received for a certain period.

According to another aspect, there is provided a wireless transmission method executed by a wireless transmission system comprising a plurality of wireless apparatuses corresponding to a plurality of components of an elevator, respectively, the plurality of components outputting signals used for controlling the elevator, the wireless transmission method comprising:

maintaining, by each of the wireless apparatuses, a value which is updated every time a first signal output by a corresponding component is transmitted to other wireless apparatuses wirelessly, or a second signal output by each of components corresponding to the other wireless apparatuses which is transmitted from the other wireless apparatuses wirelessly is received; and

transmitting, by each of the wireless apparatuses, the first signal when the maintained value agrees with a value determined in advance with respect to each of the wireless apparatuses, wherein

values determined in advance with respect to

the plurality of wireless apparatuses, respectively, are different from one another,

transmitting a third signal using a predetermined wireless apparatus of the plurality of wireless apparatuses, the third signal being a substitute of the second signal, when the value maintained by the counter does not agree with a value determined in advance with respect to the predetermined wireless apparatus, and the second signal is not received for a certain period,

controlling at least ascending and descending operation of a car using an elevator control device, the plurality of components comprising the elevator control device, and

notifying the elevator control device, using the wireless apparatus corresponding to the elevator control device, that the second signal is not received for a certain period.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustration showing a structure of an elevator according to an embodiment.

FIG. 2 is a diagram for describing an example of a functional configuration of each of wireless apparatuses which constitute a wireless transmission system according to the present embodiment.

FIG. 3 is a flowchart showing an example of a procedure of a process executed in a wireless apparatus operating as a parent node.

FIG. 4 is a flowchart showing an example of a procedure of a process executed in a wireless apparatus operating as a child node.

FIG. 5 is a diagram for describing a specific example of an operation of the wireless transmission system according to the present embodiment.

DETAILED DESCRIPTION

Embodiments will be described hereinafter with reference to the accompanying drawings.

In general, according to one embodiment, a wireless transmission system includes a plurality of wireless apparatuses corresponding to a plurality of components of an elevator which output signals used for controlling the elevator, respectively. Each of the wireless apparatuses includes a transmitter, a receiver, and a counter. The transmitter transmits a first signal, which is output by a corresponding component, to other wireless apparatuses wirelessly. The receiver receives a second signal output by each of

WHAT IS CLAIMED IS:

1. A wireless transmission system comprising a plurality of wireless apparatuses corresponding to a plurality of components of an elevator, respectively, the plurality of components outputting signals used for controlling the elevator, each of the plurality of wireless apparatuses comprising:

a transmitter configured to transmit a first signal, which is output by a corresponding component, to other wireless apparatuses wirelessly;

a receiver configured to receive a second signal output by each of components corresponding to the other wireless apparatuses from each of the other wireless apparatuses wirelessly; and

a counter configured to maintain a value which is updated every time the first signal is transmitted or the second signal is received, wherein

the transmitter is configured to transmit the first signal when the value maintained by the counter agrees with a value determined in advance with respect to the wireless apparatus comprising the transmitter, and

values determined in advance with respect to the plurality of wireless apparatuses, respectively, are different from one another,

the transmitter comprised in a predetermined wireless apparatus of the plurality of wireless apparatuses is configured to transmit a third signal, which is a substitute of the second signal, when the value maintained by the counter does not agree with a value determined in advance with respect to the predetermined wireless apparatus, and the second signal is not received for a certain period,

the plurality of components comprise an elevator control device configured to control at least ascending and descending operation of a car;

the predetermined wireless apparatus is a wireless

apparatus corresponding to the elevator control device; and

the wireless apparatus corresponding to the elevator control device further comprises a notification module configured to notify the elevator control device that the second signal is not received for a certain period.

2. The wireless transmission system of Claim 1, wherein:

the transmitter comprised in a predetermined wireless apparatus of the plurality of wireless apparatuses is configured to transmit a third signal for starting transmission of a signal among the plurality of wireless apparatuses;

the counter comprised in the predetermined wireless apparatus is configured to reset the value maintained by the counter when the third signal is transmitted;

the receiver comprised in a wireless apparatus other than the predetermined wireless apparatus is configured to receive the transmitted third signal; and

the counter comprised in the wireless apparatus other than the predetermined wireless apparatus is configured to reset the value maintained by the counter when the third signal is received.

3. The wireless transmission system of Claim 2, wherein the transmitter comprised in the predetermined wireless apparatus is configured to transmit the third signal when the value maintained by the counter agrees with an upper limit value defined by the number of wireless apparatuses.

~~4. The wireless transmission system of Claim 1, wherein the transmitter comprised in a predetermined wireless apparatus of the plurality of wireless apparatuses is configured to transmit a third signal, which is a substitute of the second signal, when the value maintained by the counter does not agree with a~~

~~value determined in advance with respect to the predetermined wireless apparatus, and the second signal is not received for a certain period.~~

~~5. The wireless transmission system of Claim 4, wherein:~~

~~the plurality of components comprise an elevator control device configured to control at least ascending and descending operation of a car;~~

~~the predetermined wireless apparatus is a wireless apparatus corresponding to the elevator control device; and~~

~~the wireless apparatus corresponding to the elevator control device further comprises a notification module configured to notify the elevator control device that the second signal is not received for a certain period.~~

~~6~~4. The wireless transmission system of Claim 1, wherein the transmitter is configured to transmit a third signal representing that the first signal is nonexistent when the value maintained by the counter agrees with the value determined in advance with respect to the wireless apparatus comprising the transmitter, and the first signal to be output by the component corresponding to the wireless apparatus does not exist.

~~7~~5. The wireless transmission system of Claim 1, wherein:

~~the plurality of components comprise an elevator control device configured to control at least ascending and descending operation of a car; and~~

a plurality of values are defined with respect to a wireless apparatus corresponding to the elevator control device.

~~8~~6. A wireless transmission method executed by a wireless transmission system comprising a plurality of wireless apparatuses corresponding to a plurality of components of an elevator, respectively, the plurality

of components outputting signals used for controlling the elevator, the wireless transmission method comprising:

maintaining, by each of the wireless apparatuses, a value which is updated every time a first signal output by a corresponding component is transmitted to other wireless apparatuses wirelessly, or a second signal output by each of components corresponding to the other wireless apparatuses which is transmitted from the other wireless apparatuses wirelessly is received; and

transmitting, by each of the wireless apparatuses, the first signal when the maintained value agrees with a value determined in advance with respect to each of the wireless apparatuses, wherein

values determined in advance with respect to the plurality of wireless apparatuses, respectively, are different from one another,

transmitting a third signal using a predetermined wireless apparatus of the plurality of wireless apparatuses, the third signal being a substitute of the second signal, when the value maintained by the counter does not agree with a value determined in advance with respect to the predetermined wireless apparatus, and the second signal is not received for a certain period,

controlling at least ascending and descending operation of a car using an elevator control device, the plurality of components comprising the elevator control device, and

notifying the elevator control device, using the wireless apparatus corresponding to the elevator control device, that the second signal is not received for a certain period.