CLAIMS

1. An elevator system comprising an identifier provided in a shaft of an elevator, and a detection unit provided on a car of the elevator to detect the identifier, the system comprising:

a storage unit that stores heights of floors of the elevator;

an atmospheric pressure measuring unit provided on the car to measure atmospheric pressure at a height where the identifier detected by the detection unit is located;

a calculation unit that calculates atmospheric pressure at each floor of the elevator, based on the atmospheric pressure at the height where the identifier is located, and the heights of the floors stored in the storage unit; and

a determination unit that determines a position of the car from the atmospheric pressure at each floor calculated by the calculation unit, and the atmospheric pressure measured by the atmospheric pressure measuring unit,

wherein

the identifier is provided in the shaft near a landing on a floor through which the car is capable to pass, and

when the detection unit detects the identifier, the calculation unit calculates atmospheric pressure corresponding to the height of each floor stored in the storage unit, based on the atmospheric pressure measured by the atmospheric pressure measuring unit, and updates atmospheric pressure at each floor stored in the storage unit.

2. The elevator system according to claim 1, wherein

the identifier is a magnet, and has a different polarity depending on a place where the identifier is provided.

3. The elevator system according to claim 1, further comprising:

a communication interface that outputs information on an abnormality in the identifier provided in a predetermined height range or the detection unit when the detection unit does not detect the identifier in the height range.

4. The elevator system according to claim 1, further comprising:

a communication interface,

wherein

the identifier is a magnet,

the elevator system determines whether or not the car has passed through the predetermined range based on information indicating the predetermined height range containing the magnet and the position of the car determined by the determination unit,

when the elevator system has determined that the car has passed through the predetermined range, the elevator system determines whether or not the detection unit has detected the magnet within the predetermined height range,

when the elevator system has determined that the detection unit has not detected the magnet in the predetermined height range, the communication interface outputs signal indicating that there is an abnormality where the magnet in the height range has fallen off,

magnets are installed on a top floor, a middle floor, and a bottom floor, and have different polarities depending on the floors where the magnets are provided, and

the detection unit includes a north-pole detection unit and a south-pole detection unit.

5. The elevator system according to claim 4, wherein

the calculation unit detects, based on information from the north-pole detection unit and the south-pole detection unit, which floor of the top floor, the middle floor, and the bottom floor the car exists,

the calculation unit stores information indicating that the atmospheric pressure measured by the atmospheric pressure measuring unit in the storage unit by mapping the atmospheric pressure to the detected floor,

the calculation unit calculates the atmospheric pressure corresponding to the height of each floor based on the atmospheric pressure associated with the detected floor and the atmospheric pressure associated with a different floor detected in the past, and

the calculation unit updates the atmospheric pressure for each floor stored in the storage unit.

6. The elevator system according to claim 4, wherein

the elevator system determines whether or not atmospheric pressure difference between the atmospheric pressure measured first for the detected floor and the current atmospheric pressure measured for the floor is greater than or equal to a threshold,

when the elevator system has determined that the atmospheric pressure difference is greater than or equal to the threshold, the atmospheric pressure measurement unit stores information indicating the current atmospheric pressure in the memory unit associated with the detected floor, and calculates the atmospheric pressure corresponding to the height of each floor based on the atmospheric pressure associated with the detected floor and the atmospheric pressure associated with the different floor detected in the past.

7. A car position determination method of determining a position of a car of an elevator, based on detection of an identifier provided in a shaft of the elevator by a detection unit provided on the car, the method comprising:

measuring, by an atmospheric pressure measuring unit provided on the car, atmospheric pressure at a height where the identifier detected by the detection unit is located;

calculating, by a calculation unit, atmospheric pressure at each floor of the elevator, based on the atmospheric pressure at the height where the identifier is located, and heights of floors stored in a storage unit;

determining, by a determination unit, the position of the car from the atmospheric pressure at each floor calculated by the calculation unit, and atmospheric pressure measured by the atmospheric pressure measuring unit,

wherein

the identifier is provided in the shaft near a landing on a floor through which the car is capable to pass, and

when the detection unit detects the identifier, the calculation unit calculates atmospheric pressure corresponding to the height of each floor stored in the storage unit, based on the atmospheric pressure measured by the atmospheric pressure measuring unit, and updates atmospheric pressure at each floor stored in the storage unit.

8. The car position determination method according to claim 7,

(a) wherein the identifier is a magnet and magnets are installed on a top floor, a middle floor, and a bottom floor, and have different polarities depending on the floors where the magnets are provided;

(b) the detection unit includes a north-pole detection unit and a south-pole detection unit; and

(c) wherein the method further comprises:

determining whether or not the car has passed through the predetermined range based on information indicating the predetermined height range containing the magnet and the position of the car determined by the determination unit;

when the car has passed through the predetermined range, determining whether or not the detection unit has detected the magnet within the predetermined height range; and

when the detection unit has not detected the magnet in the predetermined height range, outputting via a communication interface a signal indicating that there is an abnormality where the magnet in the height range has fallen off.