

FLOOR DOOR APPARATUS FOR ELEVATOR SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a floor door apparatus for an elevator system, and in particular to an improved floor door apparatus for an elevator system which is capable of preventing a floor door from being opened by an external force during the operation of an elevator, for thus preventing an accident.

2. Description of the Conventional Art

Generally, an elevator system with floor doors which are vertically opened and closed, is used for loading and unloading bulky or heavy things and is installed in a factory, a vehicle parking system, an officetel, etc.

Figure 1 is a front view illustrating a conventional floor door apparatus for an elevator system, Figure 2 is a plan view illustrating a front portion of Figure 1, Figure 3 is a plan view illustrating the "A" portion of Figure 1, and Figure 4 is a cross-sectional view taken along the line IV-IV' of Figure 1.

The construction of a conventional floor door apparatus for an elevator system will now be explained with reference to Figures 1 through 4.

Vertical first and second columns 102 and 104 are installed

in the floor door apparatus and are spaced-apart from each other.

A pulley 106 is fixedly disposed on an upper portion of the first column 102, and a driving motor 110 is disposed in a portion where is spaced-apart from the pulley 106 for providing a driving force to the floor door apparatus. The driving force by the driving motor 110 is transferred to the pulley 106 through a chain 108.

In addition, brackets 116 and 117 are disposed on the upper portion of the first and second columns 102 and 104. First and second rollers 112 and 114 are rotatably disposed in the brackets 116 and 117. A first door 118 is slidably inserted between the first and second columns 102 and 104 in a lower portion therebetween. A second door 120 is slidably inserted between the first and second columns 102 and 104 in an upper portion therebetween.

Third and fourth rollers 122 and 124 are spacedly disposed on the upper portion of the second door 120.

A movable counterweight 126 is disposed beside the first column 102, and one end of a first wire rope 128 is connected to the counterweight 126, and the other end of the first wire rope 128 is connected to an upper portion of the first door 118 through the pulley 106 and the first and second rollers 112 and 114.

One end of a second wire rope 130 is connected to the

counterweight 126, and the other end thereof is connected to the bracket 117 through the pulley 106, the first, third, and fourth rollers 112, 122, and 124.

A switch cam 132 is disposed in a portion of the first door 118 for detecting the movement of the first door 118, and first and second gate switches 134 and 136 are disposed in a portion of the second column 104 for detecting the movement of the switch cam 132.

A strike 138 is formed in a portion of the first door 118, and a locker 140 is disposed in a lower portion of the second column 104 for locking the strike 138.

The operation of the conventional floor door apparatus for an elevator system will now be explained with reference to Figures 1 through 4.

First, when a passenger (or a user) turns on an operation switch, the locker 14 is turned on, for thus unlocking the strike 138.

Thereafter, the driving motor 110 is driven, and the first and second wire ropes 128 and 130 are wound and unwound, respectively, in a predetermined direction. The winding and unwinding operations of the first and second wire ropes 128 and 130 are more easily performed along the first column 102 in cooperation with the counterweight 126, so that the first and second doors 118 and 120 are slidably and vertically moved between the first and second columns 102 and 104.

During the operation of the elevator, the switch cam 132 disposed in the first door 118 moves between the first and second gate switches 134 and 136 and transfers a predetermined information to a controller (not shown), so that the operation of the driving motor 110 is controlled based on the information transferred thereto.

However, in a state that the first and second doors 118 and 120 are closed during the operation of the elevator, the first door 118 is stably locked by the locker 140, so that the first door 118 is not opened during the operation of the elevator; however, since the second door 120 is not locked, the second door 120 may be opened by external force during the operation of the elevator, for thus causing accident.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a floor door apparatus for an elevator system which overcomes the aforementioned problems encountered in the conventional art.

It is another object of the present invention to provide an improved floor door apparatus for an elevator system which is capable of preventing a floor door from being opened by an external force during the operation of an elevator, for thus preventing an accident.

To achieve the above objects, there is provided a floor door apparatus for an elevator system which includes first and second doors slidably inserted between the first and second columns, a counterweight disposed beside the first column, a plurality of brackets spacedly disposed on an upper portion of the first door, a plurality of sprockets spacedly disposed in a lower portion of the second door, a strike disposed in the first door for being locked by a locker disposed in the second column, a wire rope one end of which is connected to the counterweight and the other end of which is connected to an upper portion of the first door, and a chain one end of which is connected to the frame, and the other end of which is connected to the bracket disposed in the first door through the sprockets.

Additional advantages, objects and features of the invention will become more apparent from the description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

Figure 1 is a front view illustrating a conventional floor

door apparatus for an elevator system;

Figure 2 is a plan view illustrating a front portion of Figure 1;

Figure 3 is a plan view illustrating the "A" portion of Figure 1;

Figure 4 is a cross-sectional view taken along the line IV-IV' of Figure 1;

Figure 5 is a front view illustrating a floor door apparatus for an elevator system according to the present invention;

Figure 6 is a plan view illustrating the "C" portion of Figure 5;

Figure 7 is a plan view of Figure 5;

Figure 8 is a cross-sectional view taken along the line VIII-VIII' of Figure 5; and

Figure 9 is a cross-sectional view taken along the line IX-IX' of Figure 5.

DETAILED DESCRIPTION OF THE INVENTION

Figure 5 is a front view illustrating a floor door apparatus for an elevator system according to the present invention, Figure 6 is a plan view illustrating the "C" portion of Figure 5, Figure 7 is a plan view of Figure 5, Figure 8 is a cross-sectional view taken along the line VIII-VIII' of Figure

5, and Figure 9 is a cross-sectional view taken along the line IX-IX' of Figure 5.

As shown therein, first and second vertical columns 2 and 4 are spacedly disposed in the floor door apparatus.

A guide rail 6 is attached to one side of the second column 4, and a counterweight 8 is disposed beside the second column 4.

In addition, a guide rail 10 is attached to one side of the second column 4. A first gate switch assembly 12 is disposed in a lower portion of the second column 4 in another side of the second column 4, and a second gate switch assembly 14 is disposed in an upper portion of the second column 4 and is spaced-apart from the first gate switch assembly 12.

A frame 16 is disposed on an upper portion of the first and second columns 2 and 4, and a driving motor 18 is disposed at one end of the frame 16 for providing a driving force to the floor door apparatus. In addition, a pulley 22 is disposed on the upper portion of the first column 2, and the driving force from the driving motor 18 is transferred to the pulley 22 through a chain 20.

First and second doors 24 and 26 are slidably inserted between the guide rails 6 and 10. A plurality of door shoes 28 are disposed on both sides of the first door 24 and on both sides of the second door 26.

As shown in Figure 9, a plurality of brackets 30 are spacedly disposed in the upper portion of the first door 24, and

the brackets 30 are spaced-apart from the lower portion of the second door 26 by a predetermined distance.

One end of a wire rope 32 is connected to a counterweight 8, and the other end of the wire rope 32 is connected to the first door 24 through the pulley 22 and the first and second rollers 35 and 36.

In addition, first and second sprockets 38 and 40 are spacedly disposed in a lower portion of the second door 26. One end of a chain 42 is connected to a fixing screw 44 disposed in the frame 16, and the other end of the chain 42 is connected to the fixing screw 44 disposed in the bracket 30 disposed in the first door 24 through the first and second sprockets 38 and 40.

A switch cam 48 is disposed in a portion of the first door 24 for detecting the movement of the doors, and a strike 50 is disposed in a lower portion of the first door 24.

A locker 52 is disposed in a lower portion of the second column 4 for locking/unlocking the strike 50 of the first door 24.

The operation of the floor door apparatus for an elevator system according to the present invention will now be explained with reference to Figures 5 through 9.

First, when an operator (or a user) turns on an operation switch, the locker 52 is turned on, and a strike 50 becomes an unlocked state.

In the above state, when the driving motor 18 is operated,

the pulley 22 connected with the driving motor 18 by the chain is driven.

Therefore, in accordance with an operation mode, the counterweight 8 is downwardly moved along the first column 2, and the first wire rope 32 connected to the counterweight 8 is moved in the same direction as the counterweight 8, so that the pulley 22 and the first and second rollers 35 and 36 are rotated.

The first door 24 is upwardly moved along the guide rails 6 and 10 disposed between the first and second columns 2 and 4, respectively.

When the first door 24 is upwardly moved, and the second door 26 connected with the first door 24 by the chain 42 is upwardly moved.

The first and second doors 24 and 26 are upwardly moved, and the switch cam 48 escapes from the first gate switch assembly 12. The movements of the doors are checked by the controller.

As the switch cam 48 is continuously moved, when the switch cam 48 arrives at the second gate switch assembly 14, the controller stops the operation of the driving motor 18.

When the first and second doors 24 and 26 are opened, vehicle or other things are loaded into the elevator.

When closing the first and second doors 24 and 26, the driving motor 18 is reversely driven, and the counterweight 8 is

upwardly moved.

As the first wire rope 32 is downwardly moved along the first and second rollers 35 and 36, the first door 24 is downwardly moved, for thus closing the entrance of the elevator. As the first door 24 is downwardly moved, the second door 26 connected with the first door 24 by the chain 42 is downwardly moved, so that the first and second doors 24 and 26 are closed.

When the first and second doors 24 and 26 are closed, the switch cam 48 escapes from the second gate switch assembly 14 and arrives at the first gate switch assembly 12. When the switch cam 48 arrives at the first gate switch assembly 12, the operation of the driving motor 18 is stopped.

One end of the strike 50 is locked by the locker 52.

The above-described embodiments of the present invention is not limited to the two-door mechanism. Namely, three-door mechanism, four-door mechanism, or more-door mechanism may be adapted to the present invention.

As described above, since the first and second doors are connected by the chain, both the first and second doors can be locked during the operation of the elevator, so that the second door is not opened by external force, for thus preventing various accidents and enhancing the reliability of the elevator.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions

and substitutions are possible, without departing from the scope and spirit of the invention as recited in the accompanying claims.



What is claimed is:

1. A floor door apparatus for an elevator system having first and second columns having guide rails, a frame connected between the first and second columns, and a driving motor disposed in the frame for generating a driving force, comprising:

first and second doors slidably inserted between the first and second columns;

a counterweight disposed beside the first column;

a plurality of brackets spacedly disposed on an upper portion of the first door;

a plurality of sprockets spacedly disposed in a lower portion of the second door;

a strike disposed in the first door for being locked by a locker disposed in the second column;

a wire rope one end of which is connected to the counterweight and the other end of which is connected to an upper portion of the first door; and

a chain one end of which is connected to the frame, and the other end of which is connected to the bracket disposed in the first door through the sprockets.

2. The apparatus of claim 1, wherein at least more than two doors are slidably inserted between the first and second

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columns.

3. The apparatus of claim 2, wherein said at least more than two doors are always overlapped.

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