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**The Registry of Patents**
**Intellectual Property Office of Singapore**

**Attention: Ms. Jennie Ong**

Our Reference : 29095SG28/MKC
Your Reference : 2015/1515560913Q

Dear Sirs,

**Singapore Patent Application No. 10201501070U**
**Invention : Elevator-Group Management System**
**Applicant : Toshiba Elevator Kabushiki Kaisha**

In response to the Written Opinion which accompanied your letter of 8 December 2015, we enclose the following documents to effect amendment:-

1. Patents Form 13A
2. A copy of replacement pages 39, 39a and 40
3. A copy of replacement description pages 2, 2a and 2b

**1. New documents filed / Response to lack of support objections**

In response to the Examiner objecting that previous claim 1 is not supported for lack of reciting essential features, new claim 1 now incorporates the subject-matter of original claims 2, 3 and 4, as shown in the enclosed annotated claim pages. Original claims 2, 3 and 4 are deleted.

We elaborate on the underlying concept for each of the original claims 2, 3 and 4 as follows.

The amendment in respect of the "assignment request issuing means" is based on original claim 2. In doing so, we have clarified that assignment evaluation processing in the elevator-group management system adopts a real-time scheduling (RTS) method (hereinafter, RTS assignment evaluation processing) is distributed over the car controllers.

The amendment in respect of the "assignment evaluation means" is based on original claim 4. In doing so, we have clarified that the virtual assignment patterns are limited to likely ones and then the likely virtual assignment patterns are evaluated. In doing so, we have clarified that assignment evaluation occurs in accordance with algorithm A that is described in the present application from page 20, line 21 to page 29, line 30 and page 34, line 11 to page 38, line 11. .

The amendment in respect of the "operation prediction evaluating means and evaluation result transmitting means" is based on original claim 3. In doing so, we have clarified that each of the car controllers executes the RTS assignment evaluation processing on an associated one of the cars.

The above explanation thus addresses each of the points raised by the Examiner in relation to previous claim 1 not reciting essential features to achieve its stated objectives. Accordingly, new claim 1 is now fully supported by the description.

The description on original page 2 is also amended to be consistent with the language of new claim 1.

**2. Novelty**

The Examiner acknowledges novelty of the subject-matter of the original claims 1 to 4. Given that new claim 1 results from a combination of the subject-matter of the original claims 1 to 4, the subject-matter of new claim 1 remains novel.

**3. Inventive Step**

New claim 1 defines an elevator group management system that comprises a common board (a group management controller: a group master) and car control boards. The common board and each of the car control boards are connected such that they can exchange information with each other.

When the elevator-group management system adopts real-time scheduling (RTS, as explained under the heading "New documents filed in relation to new claim 1 incorporating the subject-matter of original claim 2), the following control processing is considered: (a) centralized control, (b) distributed control, (c) a combination of the distributed control and the centralized control (without the application of the algorithm A), and (d) a combination of the distributed control and the centralized control (with the application of the algorithm A).

The inventive concept underlying new claim 1 is that the elevator-group management system is configured to execute the control processing of (d) above, i.e. the combination of the distributed control and the centralized control, the combination being done in accordance with the algorithm A. That is, the present invention is directed to an elevator-group management system comprising a group management controller (a group master) and a plurality of car controllers, the elevator-group management system being configured to distribute assignment evaluation processing over the plurality of car controllers under the control of the group management controller.

Each of the car controllers makes a plurality of virtual assignment patterns for an associated one of the cars. Each car controller evaluates operation schedules of these virtual assignment patterns, and transmits evaluation values as evaluation results for the associated car (see page 35, line 1 to page 36, line 8 of the present application).

The group management controller finally determines a car to which the assignment request call (new hall call) is to be assigned, based on the evaluation results for the cars. At this time, instead of evaluating all the virtual assignment patterns obtained as the evaluation results for the cars, the group management controller limits the virtual assignment patterns to likely ones to be virtually evaluated using the algorithm A, and evaluates the likely virtual assignment patterns (see page 36, line 9 to page 37, line 3 of the present application).



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According to this configuration, the processing load on the group master, namely, the group management controller can be reduced. Further, each of the car controllers prepares and evaluates virtual assignment patterns not for all the cars but for an associated one of the cars. Therefore, it is possible to eliminate waste such as the redundancy in the preparation or evaluation processing of the virtual assignment pattern and to obtain evaluation results efficiently.

Further, the group master, namely, the group management controller can select an optimal one of the cars based on the evaluation results for the cars. At this time, it is possible to greatly reduce processing time by limiting virtual assignment patterns to be evaluated to likely ones according to the algorithm A and evaluating the likely virtual assignment patterns. Therefore, even if the number of cars increases, an optimal one of the cars can be selected in the shortest possible time and be then made to response to a call.

On the other hand, D1 (US 5298696 A) discloses a technique of distributing assignment evaluation processing over a plurality of car controllers. However, document D1 only discloses a technique of distributing assignment evaluation processing in a general group management system. D1 does not disclose a technique of distributing assignment evaluation processing in a group management system adopting the RTS method.

The RTS method is a method for predicting and evaluating an operation of each of cars in consideration of an influence of a presently assigned call upon a call which will be made and an influence of a call which will be made upon all calls which have already been assigned to cars but for which the cars have not yet arrived. It is possible to select a more appropriate to-be-applied car by calculating evaluation values for each of cars based on the RTS. However, since the operation prediction of each car is repeated for each of the virtual assignment patterns of a call, the computational complexity increases significantly.

Therefore, the present invention achieves an increase in the efficiency of the RTS assignment evaluation processing by the above-described control processing of (d) above, i.e. the combination of distributed control and centralized control, the combination being done in accordance with the algorithm A. In this way, even if the number of cars increases, an optimal one of the cars can be selected as in the shortest possible time and be then made to response to a call. Document D1 is silent on the use of such an RTS method.

D2 (US 6345697 B1) discloses an evaluation algorithm developed in consideration of possible future passenger traffic situations. However, in D2, the assignment processing of the hall call using its disclosed evaluation algorithm is executed by its main controller (group master). This control processing is based on centralized control as described in (a) above.

The present invention is distinguished from the teachings of D2 from claim 1 of the present application reciting features that provide for a combination of distributed control and centralized control, the combination being done in accordance with the algorithm A. The approach defined in new claim 1 is thus more than simply "limiting the evaluation to only a sub-set of possible patterns", which is the conclusion the Examiner has reached when he combines the teachings of D1 with D2. Even if the teachings of D1 and D2 were combinable, the result would lead to a



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configuration that is very different from the approach defined in new claim 1. Therefore, new claim 1 is inventive over the teachings of D1 and D2.

We look forward to receiving a clear Examination Report at the Examiner's earliest convenience.

Yours faithfully,

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Enc.



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