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Description



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Method for selection of the most favourable lift of a lift installation comprising at least two lift groups

The invention relates to a method for selection of the most favourable lift of a lift installation comprising at least two lift groups.

There is known from the specification EP 0 891 291 B1 a multi-group control for several lift groups with destination call control and immediate allocation, in which the destination call input is undertaken inter alia at any call registration device, which is not assigned to a specific lift group, and the allocated lift can be made recognisable in clear and simple manner. By immediate allocation it is to be understood that the most favourable lift is immediately allocated to the passenger destination call. The passenger thus does not need to know the division of the building into storey regions which are served only by individual lift groups. The passenger is informed at an optimal time by visual and acoustic instructions in the lift cage about the next connection leading to the destination storey. There is no precise method indicated exactly how the known multi-group control selects the most favourable lift when the travel between start storey and destination storey is provided with changeovers. At the same time, also no method is indicated how the multi-group control can select the most favourable route when several routes lead to the destination storey.

An object of the invention resides in proposing a method of the kind stated in the introduction which indicates a precise procedure how the most favourable lift can be selected when journeys are present in which the passenger has to make a change.

This object is met by the features of claim 1.

An advantage of the invention is to be seen in that the most optimal lift cages in terms of costs from the start to the destination are selected. The passenger is thus taken to the destination storey as quickly as possible without loss of time.

Advantageous developments and improvements of the method indicated in claim 1 are possible by the measures expressed in the dependent claims.

In one form of embodiment the lift groups each comprise a corresponding group control. This has the advantage that each lift group can be controlled automatically.

In a preferred form of embodiment each group control comprises a destination call control with immediate allocation. This has the advantage that in each lift group always the best lift of the group can be selected. The early recognition of the destination storey makes it possible to undertake the selection from the lift cages which can serve the destination storey.

In a further form of embodiment the group controls of all lift groups are connected into a central multi-group control (MGS). This has the advantage that the selection from all lifts in question can take place automatically from a central unit, particularly when the zones served by several lift groups intersect.

In another form of embodiment several routes are available for reaching the destination storey from the start storey, wherein the most favourable route is ascertained. This has the advantage that the problem arising with lift groups, namely several possible routes with changeovers, can be solved. The most optimal and quickest route from the start to the destination is thus selected.

All explained features are usable not only in the respectively indicated combination, but also in other combinations or by themselves without departing from the scope of the invention.

Different embodiments of the invention are illustrated in the schematic drawings and explained in more detail in the following description, in which:

Fig. 1 shows an illustration of four destination call group controls which are connected in common with a multi-group control and

Figs. 2 to 5 show flow charts indicating a method for selection of the most favourable journey.

Figures 1 to 5 are as a matter of course provided with the following legends:

DB	Data bank, multi-group configuration
FW	Favourite route / most favourable route / best line
GR	Lift group
GR-PC	Group control computer
GR1, 2, 3, 4	Group control 1, 2, 3, 4
MG-PC	Multi-group control computer
MGS	Central multi-group control
U1, U2, U3	Changeover storey 1, 2, 3
W1, ... , Wn	Route
W1T1	Route 1, stretch 1
WnTn	Route n, stretch n

The passenger in the lobby or, however, at any storey inputs the destination storey at one of the multi-group terminals. A central multi-group control MGS compares the desired journey with an own data bank or a journey array in order to establish whether the desired destination storey can be achieved only by one route, also termed line.

In the case of only one possibility of reaching the destination storey by one or several changeovers, the selection of the line is no problem.

If there are several routes - for example, Journey 1: high-rise shuttle with one group and then, after changeover, travel downwards with a lift of another group, or Journey 2: low-rise shuttle with one group and, after changeover, travel upwards with a lift of another group - there is initially selected the most likely shortest route, in terms of time, to the destination on the basis of statistical values and the instantaneous travel situation. After selection of the best line, the extended journey is broken down into individual stretches which can usually be served by different lift groups.

If one of the part travels can be dealt with by several lift groups, a multi-group control comes into function (as, for example, according to patent EP 0 891 291 B1) in order to determine the first lift to be used. In the case of only one lift group, this multi-group control determines the best lift.

The first lift to be used is thus evaluated and communicated on the terminal display to the

passenger.

During the journey the central multi-group control MGS tracks the course over time of the lift travel with respect to arrival at the changeover storey. As soon as the approach time to the changeover storey is fixed (no more intermediate stops possible), the evaluation of the best lift of the next group for the second journey part begins.

As soon as the next, best lift is selected, the passenger in the cage can be informed. The next lift to be used to each destination storey, the attainment of which is possible only by changeovers, is indicated on a cage information system or other display. At the same time the speech announcing system is actuated. This instruction can also be combined for several destination storeys and/or connecting lifts.

Some advantages of this solution are indicated in the following:

The central multi-group control MGS selects the optimal route from the start storey to the destination storey, divides the selected line up into individual part journeys, i.e. lift groups, which select the best lift only for the most optimal moment and, in particular, on the basis of the precisely established remaining travel time in the previously used lift, the alighting time, the path for walking over between two successively used lifts, the approach time of the lift, which is soon to be used, for the changeover storey and all other factors which are used in a known multi-group control (such as, for example, according to patent EP 0 891 291 B1) for determining the best lift.

The passenger is optically and acoustically informed about the next connection at the earliest possible moment.

An immediate allocation takes place, i.e. the passenger is allocated a cage immediately after the destination call input.

The passenger does not have to carry a device giving directions.

Figure 1 shows, as example, four group controls GR1, GR2, GR3, GR4 which correspondingly have four group-control computers GR1-PC, GR2-PC, GR3-PC, GR4-PC. The group controls GR1, GR2, GR3, GR4 are combined by way of the group control

computers GR1-PC, GR2-PC, GR3-PC, GR4-PC in common into a central multi-group control MGS, which comprises a data bank DB and a multi-group control computer MG-PC.

The flow charts of Figures 2 to 5 are described in more detail in the following, wherein the flow charts in this example are, for the sake of simplicity, shown only up to the third stretch.

The passenger inputs from the starting storey S a new destination call to the destination storey Z.

The central multi-group control MGS compares the desired journey with an own data bank for a journey array DB in order to establish whether the desired destination storey can be reached by way of one route or by way of several routes $W_1, \dots, W_n$.

Case A):

If several routes from the start storey S to the destination storey Z exist, then the first route W_1 is divided into stretches $W_{1T1}, W_{1T2}, \dots, W_{1Tn}$, wherein n is an integral number. The further routes $W_2, \dots, W_n$ are similarly broken down into stretches $W_{2T1}, \dots, W_{2T2}, \dots, W_{2Tn}$ or $W_{nT1}, W_{nT2}, \dots, W_{nTn}$. The lift operating costs of the respective stretches $W_{1T1}, W_{1T2}, \dots, W_{1Tn}; W_{2T1}, W_{2T2}, \dots, W_{2Tn}$ and $W_{nT1}, W_{nT2}, \dots, W_{nTn}$ are then interrogated in the corresponding relevant group controls GR1, GR2, $\dots$, GR n . The lift operating costs of the respective paths $W_{1T1}, W_{1T2}, \dots, W_{1Tn}; W_{2T1}, W_{2T2}, \dots, W_{2Tn}$ and $W_{nT1}, W_{nT2}, \dots, W_{nTn}$ are now compared in the multi-group control computer MG-PC of the central multi-group control MGS and the favourite route FW ascertained. The lift is allocated to the group control computer which is to control the first stretch and cancellation of the order is caused at the remaining group control computers which do not have the first stretch at the favourite route FW. Travel over the first stretch S-U1 from the start storey S to the first changeover storey U1 is then undertaken. As soon as it is established that no more intermediate stops are possible, the multi-group control computer MG-PC is informed that the changeover storey U1 is the next destination. In the same manner, the lift allocation is then made to the selected lift group at which the second stretch from the first changeover storey U1 to the destination storey U1-Z or to the second changeover storey U2 U1-U2 is carried out. If the destination storey Z lies at the end of

the second stretch, then the second stretch U1-Z is travelled over and the passenger has reached his destination. If the destination storey Z does not lie at the end of the second stretch, then the second stretch U1-U2 is travelled over and the same procedure as previously for the further stretches is used in order to reach the destination storey Z. In this example the procedure was shown up to the third stretch; the same procedure can obviously be used for the further stretches.

Case B):

If only a single route W1 from the start storey S to the destination storey Z exists and a changeover is necessary, then this route W1 is broken down into stretches W1T1, ... , W1Tn and in the same manner as above the lift allocation for the first stretch from the start storey S to the first changeover storey U1 is carried out. As soon as the first stretch has been travelled over, the same procedure is then used for the remaining stretches as is used in case A) from the changeover storey U1. If a changeover is not necessary a normal journey from the start storey S to the destination storey Z is carried out.

Translation of legends in the drawings

- 1 Database
 - Multi-group configuration
 - Regions able to be served
 - Multiway arrays
- 2 New destination call from start storey S to destination storey Z
- 3 Several routes from S to Z?
- 4 Divide route 1 [W1] into stretches W1T1,W1T2,...,W1Tn
- 5 Divide several routes into stretches
- 6 Call up costs for W1T1,W1T2,...,W1Tn at relevant GR-PC's
- 7 Call up costs for W2T1,W2T2,...,W2Tn at relevant GR-PC's
- 8 Call up costs for stretches of the further routes at relevant GR-PC's
- 9 Changeover necessary?
- 10 Carry out normal journey
- 11 Divide route 1 [W1] into stretches W1T1,W1T2,...,W1Tn
- 12 Communication to GR-PC which is to control the first stretch: allocate lift
- 13 Lift allocation for the first stretch
- 14 Journey from S to the changeover storey U1
- 15 Costs comparison for all routes at MG-PC; determination of the cheapest route = favourite route (= FW)
- 16 Communication to GR-PC which is to control the first stretch of the FW: allocate lift
- 17 Communication to GR-PC's which do not have the first stretch at the FW: cancel order
- 18 Communication to GR-PC's which do not have the second stretch at the FW: cancel order
- 19 Communication to GR-PC's which do not have the nth stretch at the FW: cancel order
- 20 Lift allocation for the first stretch
- 21 Travel from S to changeover storey U1
- 22 Communication to MG-PC: next destination is changeover storey U1 (no more intermediate stops)
- 23 Communication to GR-PC which is to control the second stretch of the FW: allocate lift
- 24 Lift allocation for the second stretch U1-Z or U1-U2

- 25 Is the destination at the end of the second stretch?
- 26 Travel from U1 to Z
- 27 End
- 28 Travel from U1 to the changeover storey U2
- 29 Report to MG-PC: next destination is changeover storey U1 (no more intermediate stops)
- 30 Communication to GR-PC which is to control the second stretch: allocate lift
- 31 GR-PC
 - Lift allocation for the second stretch U1->Z or U1->U2
- 32 Is the destination at the end of the second stretch?
- 33 Travel from U1 to Z
- 34 End
- 35 Travel from U1 to the destination storey U2
- 36 Report to MG-PC: next destination is changeover storey U2 (no more intermediate stops)
- 37 Communication to GR-PC which is to control the third stretch: allocate lift
- 38 GR-PC
 - Lift allocation for the third stretch U2->Z or U2->U3
- 39 Is the destination at the end of the third stretch?
- 40 Analogous procedure for further stretches
- 41 Travel from U2 to Z
- 42 End
- 43 Communication to MG-PC: next destination is changeover storey U2 (no more stops)
- 44 Communication GR-PC which is to control the third stretch: allocate lift
- 45 GR-PC
 - Lift allocation for the third stretch U2-Z or U2-U3
- 46 Is the destination at the end of the third storey?
- 47 Analogous procedure for further stretches
- 48 Travel from U2 to Z
- 49 End

Patent Claims

1. Method for selecting the most favourable lift of a lift installation comprising at least two lift groups (GR), wherein a route (W1) with changeovers (U1, U2, U3) is available for reaching a destination storey (Z) from a start storey (S), the route being broken down into several stretches (W1T1, ... , W1Tn) and a lift of one of the lift groups (GR) being allocated to each of the stretches (W1T1, ..., W1Tn).
2. Method according to claim 1, wherein the lift groups (GR) each have a respective group control (GR1, GR2, GR3, GR4).
3. Method according to claim 2, wherein each group control (GR1, GR2, GR3, GR4) has a destination call control with immediate allocation.
4. Method according to claim 2 or 3, wherein the group controls (GR1, GR2, GR3, GR4) of all lift groups (GR) are connected into a central multi-group control (MGS).
5. Method according to any one of the preceding claims, wherein a further route (Wn), which is broken down into further stretches (WnT1, ... , WnTn), is available for reaching the destination storey (Z).
6. Method according to claim 5, wherein the operating costs of the stretches (W1T1, ... , W1Tn) of the route (W1) and the operating costs of the further stretches (WnT1, ... , WnTn) of the further route (Wn) are called up in the corresponding group control (GR1, GR2, GR3, GR4).
7. Method according to claim 6, wherein the called-up operating costs of the route (W1) and the further route (Wn) are compared by means of the central multi-group control (MGS) in order to ascertain the most favourable route (FW).
8. Method according to claim 7, wherein a lift of one of the lift groups (GR) is allocated to each of the stretches (W1T1, ... , W1Tn) or the further stretches (W1T1, ... , WnTn) of the most favourable route (FW).