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(54) Title: ELEVATOR SYSTEM COMPRISING A DESTINATION CONTROL SYSTEM

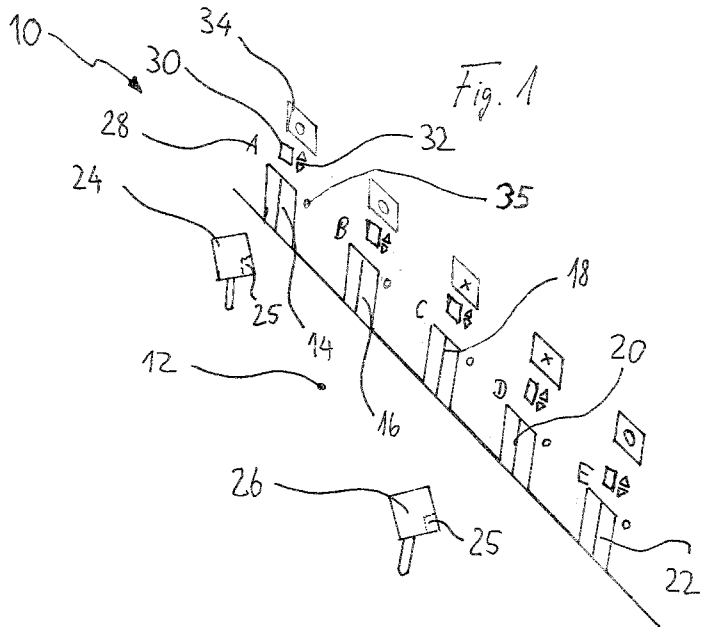

Fig. 1

(57) Abstract: The invention refers to an elevator system offering sophisticated transport capacity even under conditions where the passengers are not familiar with the use of a destination call system, e.g. on cruise ships. The elevator control system 10 comprises at least one group control with a destination control system (DCS) 52, and • - at least one elevator group having elevators 14-22 with a different destination range, • - destination operating panels (DOPs) 24, 26 at each landing, • - car operating panels (COPs) 38 located in the elevators, • - hall lantern means 30, 32 indicating the moving direction of their corresponding elevator, • - signaling means 32, 35 indicating the arrival of an elevator at the landing 12, whereby the DCS 52 is configured to display, in the vicinty of the elevators a range identifier of the elevators 14 - 22 serving the destination and to indicate the next arriving elevator.

WO 2015/106821 A1

Elevator system comprising a destination control system

Still most common in elevator technology is a call allocation method called continuous call allocation whereby on each landing up/down buttons are provided and hall lantern means are arranged at each elevator to give information about the position and moving direction of the elevator. Nowadays systems use destination call control whereby the passenger inputs his destination floor on a destination operating panel whereafter the destination control system immediately allocates an optimal elevator according to a predefined cost function, which is displayed on said destination operating panel. Sometimes the destination operating panels have separated devices for the input and display of data but the input and output devices can also be located combined on a touch screen display which is then used for input of data as well as for displaying data to the passenger.

The invention concerns particularly customized destination control systems (DCS) for cruise ships, where elevators in one group may serve different decks (floors) or users need to be guided to one of two elevator groups residing close to each other. In some boarding situations the traffic between two elevator groups (e.g. portside and starboard side) needs to be balanced because of the huge demand of transport capacity.

Particularly in elevator systems used by passengers which are not familiar with the use of destination control systems, e.g. on cruise ships, problems arise as the passengers who are not familiar with the handling of destination operating panels block the few destination operating panels whereby the efficiency of the destination control system drops essentially, particularly in times of heavy traffic. A further problem is that particularly on cruise ships with a lot of different decks, the different decks are served by different elevators which furthermore complicate the allocation of the elevators. A particular problem arises in the boarding stage when a lot of passengers try to reach their destinations served only by certain elevators of the group(s).

Accordingly, it is object of the present invention to provide an elevator system using destination control providing a high transport capacity and a high efficiency and service comfort also for inexperienced users.

The object is solved with an elevator system according to claim 1. Preferred embodiments of the invention are subject-matter of the dependent claims.

In the following description the terms deck, landing and floor are used as synonyms meaning one level serviced by the elevator system. DCS is an abbreviation for destination control system. DOP is an abbreviation for destination operating panel. COP is an abbreviation for car operating panel.

According to the invention, the elevator system does not only comprise the features related to destination call control, i.e. destination operating panels at the landings, but the elevator system also comprises car operating panels in the elevators which allow the issue of car calls within the elevators, hall lantern means for each elevator indicating the position as well as the moving direction of the corresponding elevator as well as signaling means which could be combined with the hall lantern means for each elevator indicating the arrival of an elevator at the landing floor. The car operating panel, the hall lantern means as well as the signaling means are typical features of a continuous call allocation system. Accordingly, the elevator system combines the advantage of the improved efficiency of a destination control system with the advantageous handling of a continuous call operating system which may be used by inexperienced users which are not common with the handling of destination control systems. Furthermore, each elevator has therefore a range identifier which indicates a certain destination range serviced by the elevator, which facilitates the finding of the correct elevator for a certain destination. Thereby one range identifier, e.g. a color, is identical to all elevators having the same destination range (the same serviced landings).

The destination control system of the inventive elevator system is configured to allocate the elevators of the elevator group according to the continuous call allocation principles although being a destination control system. This means that after having got a destination call via the DOP, the destination control system displays via the DOP the elevators (of one or several elevator groups) servicing the destination by indicating or displaying a corresponding range identifier, which is indicative of the destination range serviced by the corresponding elevator. Further, the destination control system controls the hall lantern means to indicate the position and the moving direction of all the elevators and the destination control system is further configured to activate the signaling means when any elevator of the at least one elevator group arrives at a landing. The DOP may optionally also be configured to indicate an allocated elevator in immediate call allocation. This allocation modes could e.g. used when there is not much traffic in the elevator system.

After having been informed via the DOP of the range identifier the passenger may look for the next adapted elevator serving his destination (via the range identifier) and the hall lantern means indicate to him which of adapted elevators will arrive next, which is then indicated by the signaling means. This facilitates the use of the elevator system comprising elevators with different destination ranges also by inexperienced passengers. The range identifier could be realized for example directly indicating the serviced destination range on a display above each elevator. The range identifier could also be a simple sign or color that is identical to all elevators with identical destination range.

The signaling means for each elevator indicating the arrival of an elevator at the landing floor may be an acoustic or a visual signaling means. The signaling means can also be a combined signaling means which gives an acoustical as well as a visual signalization of the arrival of the elevator at the landing. On this behalf the signaling means may be combined with the hall lantern means. Via this clear signalization, the passengers waiting in the lobby clearly acknowledge the arrival of the elevator, the moving direction of the elevator and also the destination range of the corresponding elevator via the range

identifier. Accordingly, even if they have not issued a destination call at a destination operating panel of the elevator system, they are able to enter the correct elevator and to issue their destination call via the car operating panel located in the elevator. Via this measure, the inventive elevator system provides a kind of hybrid system of a destination control system with continuous call allocation which is known from the old up/down push button elevator systems and improves the transport capacity of the elevator system essentially.

Thus, the inventive elevator system having a hybrid allocation system (continuous destination control) provides best efficiency as it provides more information to the elevator control than the old continuous call allocation systems where the destination floor has not been issued and had to be estimated according to statistical data. On the other hand the inventive elevator system provides a better passenger comfort to passengers which are not familiar with destination control systems or in situations where the lobby is too crowded for a proper use of immediate call allocation of a DCS. Accordingly, the inventive elevator system provides sophisticated transport efficiency also in crowded situations or peak traffic situations where the lobby is crowded which leads normally to decrease of efficiency of conventional destination control systems. The invention is preferably configured for ships, e.g. cruise vessels with a lot of decks which are served by different elevators of the elevator system. On these cruise ships, various unexperienced persons as children, old persons, handicapped persons have to be transported whereby in peak traffic situations, for example at boarding, lunch or dinner time, heavy traffic situations occur which make the handling of a pure destination control system difficult.

The invention simplifies the use of DCS considering the many kinds of users (adults, children, elderly people, disabled) traveling in groups of varying size (singles, couples, families, groups of friends), which users may not be familiar with DCS or even elevators in groups. Accordingly, the invention raises the efficiency of a DCS improving the capacity and the end user/customer comfort of the elevator system.

A further advantage of the invention is the simplicity in use for less-experienced elevator users and efficient use of elevators due to continuous call allocation. In addition, the invention simplifies landing call station arrangements so that extra call buttons (FEB/FET) are not needed if elevators in the group have different bottom/top decks.

The invention provides following advantages:

1) Guidance of users to correct elevators serving their destination deck in the case that the elevators serve different decks.
2) Guidance of users to the correct elevator group if the groups serve different decks.
3) Guidance of users to a specific elevator group to balance the traffic between two (or more) groups.
4) Efficient use of DCS (and elevators) in cruise ships taking into account the wide variety of users.

By showing the range identifier in DOP that is common to the elevators that can serve the destination, which range identifier can be for example, certain colors, literals or pictures, the inexperienced passenger can immediately recognize the correct elevators for his destination. Normal hall lantern means with up/down lanterns and signaling means with acoustic signaling as e.g. gongs and/or visual signaling means, e.g. the up/down lanterns, signal an arriving elevator. The destination car call is automatically sent to the elevator and the signaling means is lit when it arrives. The DOP may show the correct elevator group, possibly with lobby map, if several elevator groups are provided. In case several elevator groups are provided in the elevator system one multi group control can be provided or several group controls arrange via bi-directional communication the interaction as to allocate the optimal elevator of one of the groups. On this behalf the DCS provides in connection with the group control a serving cost estimate, e.g. expected waiting time, which then decides the serving elevator group or elevators of one group and informs the user/passenger.

With respect to the guidance of users to a specific elevator group to balance the traffic between two (or more) groups, it is possible to send destination calls to elevator group controls either from DOPs, preferably portable ones for easy and fast mounting in the gangway, or from the ship's access control system as all users must swipe their individual identifiers, usually ID-cards, when entering the gangway. The access control system could send the destination floor of the user where his/her cabin is located or only landing call. The latter option is preferred because of the long walking distance from the gangway to the elevator lobbies (easily 30-60 seconds with slowly walking tourists) and because they may want to travel directly to the restaurant/pool instead of their cabins. The guidance can be implemented as separate displays on the ceiling or manually by personnel who are given instructions on where to guide passengers. Anyway, the functionality is more like crowd detection, and also guidance is targeted to a crowd, e.g. "next elevator will arrive in the port side lobby" not towards individuals. Also crowd detection sensors could be applied here instead of destination calls.

The DCS can use continuous DCS call allocation, whereby the user is informed only about the elevators which serve his destinations but the next elevator to serve his destination is announced via the signaling means before its arrival at the landing. Also immediate allocation can be used in principle but the users and user groups decrease its efficiency too much.

In a preferred embodiment of the invention, the elevators with identical destination ranges are marked with the same range identifier and an allocated elevator is indicated on the destination operating panel via its range identifier. By this measure the passenger knows which elevators are to serve his destination. Thereafter he can wait for the next of these elevators to arrive in the direction of his destination which is indicated by the hall lantern means and the signaling means. Therefore the advantage of destination call

control and continuous call control is combined in a very efficient way, so that the passenger has only to concentrate on the correct elevators serving his deck/landing.

The provision of range identifiers facilitate the search for the correct elevators to serve their decks or landings as such a range identifier can be made very easy to notify, for example a literal, a number or even better, a color. If a color is used as range identifier, this color can be easily remembered by the passengers as to easily find their elevators that serve their destination floor or deck.

The range identifier is provided in the vicinity of the elevator, e.g. at its top or side or surrounding its landing door. If the range identifier is shown on a display the grouping of elevators to serve different destination ranges is selectable/changeable. The range identifier may also be a literal or color which is painted to the wall where the landing door is provided. This kind of range identifier can easily be remembered by the passengers.

The elevator system may comprise one or several elevator groups, whereby the elevators of one group or the elevators of the different groups serve different destinations. In case several groups are provided one multi-group control can be provided in which the DCS for the different elevator group is coordinated. Alternatively, several elevator group controls may be provided which interact to guide the passengers between the groups.

In a preferred embodiment of the invention, the range identifier is indicated on a display which can be controlled by the elevator control or the destination control system.

Via this range identifier being displayed on a display above the elevators, it is possible to use any desirable type of range identifier so that the range identifier can be adapted to different user groups of the elevator system. This particularly holds true if the ship is

used in different regions of the world so that the range identifier can be adapted to different languages.

Preferably, the destination operating panel as well as the car operating panel comprise an ADA-keyboard, i.e. a decade keyboard which can easily be handled also by disabled persons. This facilitates the use of the elevator system also by young children and by handicapped people.

Preferred, the destination operating panel as well as car operating panel comprise an identifier reader which initiates the destination control system to automatically read the destination of passenger having presented an ID-tag. The identifier reader may be a card reader or an RFID reader or any other corresponding identification tag reader.

The inventive elevator system can be easily added up by special calling modes as for example emergency call mode, VIP call mode by the use of individual identifiers which switch the destination control system automatically in the corresponding service mode whereby the corresponding passenger is handled with a certain preset priority.

Of course, the inventive hybrid elevator system is not only applicable on large cruise ships, but also on other places where different kind of people as well as people with low experience are using the elevator system, e.g. in malls, railway stations and airports.

It shall be remarked that the inventive elevator system works without up/down push buttons.

The DCS may switch from continuous call allocation to immediate call allocation, e.g. in quiet times, e.g. when a couple of elevators are put out of service (at night-time). In this immediate allocation the passenger is immediately informed on the DOP of his allocated elevator after having issued his destination call at the DOP.

The invention is hereinafter described schematically with the help of the enclosed drawings.

In these figures

Fig. 1 shows a perspective view of an elevator lobby comprising elevators with two different destination ranges,

Fig. 2 shows the view from inside of an elevator to the elevator car door and a car operating panel and

Fig. 3 a schematic diagram of an elevator control having a destination control system controlling functions of a continuous call allocation system.

Fig. 1 shows a perspective view of a lobby landing 12 of a landing of an elevator system 10, from which lobby there is access to at least five elevators 14, 16, 18, 20, 22. In the lobby 12, there are two destination operating panels 24, 26 which comprise an input means for issuing destination calls, e.g. an ADA-keyboard as well as a display and/or a touch screen for indicating adapted elevators serving the issued destination to the passenger, preferably immediately, after having issued the destination call. Each of the five elevators 14-22 has an individual identifier 28, in this embodiment the literals A-E. Each elevator has on its top a hall lantern means comprising a first display 30 for the actual position of the elevator as well as a second display 32 for indicating the moving direction of the elevator.

Furthermore, each elevator has a range identifier display 34 which range identifier indicates a certain destination range serviced by the elevator. The range identifier may for example be a literal, a number or a color or as in the displayed embodiment a figure as a circle and a cross. Each range identifier stands for a certain destination range of the corresponding elevator whereby on the DOP as well as eventually at any place in the eleva-

tor lobby there may be an information showing the correlation of range identifier and serviced destinations. In the presented embodiment where the range identifier is displayed on a range identifier display 34, it is even possible to indicate the destination range of the corresponding elevator directly, e.g. "decks 10 to 24".

All the equipment indicated in Fig. 1 is connected to the elevator control or elevator group control which comprises a destination control system as shown in Fig. 3. Accordingly, the inventive elevator system performs continuous destination control based on the destination operating panels 24 and 26 without up/down push buttons whereby the destination calls are issued and the possible elevators to serve the call are displayed with their range identifier. The destination control system also controls the first and second display 30, 32 of the hall lantern means as well as the destination range display 34 as well as an acoustic signaling means 35 indicating the arrival of an elevator at the landing.

Fig. 2 shows the view from the interior of an elevator 14-22 to the car door 36. Aside of the car door 36 a car operating panel (COP) 38 is located in the car wall, via which COP destinations can be input, e.g. via a decade keyboard 40 provided on a touch screen of said COP 38 or via a separate keyboard. If the car operating panel 38 is a touch screen, the ADA-keyboard 40 can be displayed on the panel. The car operating panel 38 can also indicate the next destinations of the elevator car in moving direction. Furthermore, an acoustic signaling means 42, usually a loudspeaker or gong, is provided in the elevator car to inform particularly visually handicapped people about the destinations of the car and the next stop of the elevator car.

Fig. 3 shows the elevator group control 50 comprising a destination control system 52 in which the immediate call allocation which is usually with destination call systems is performed. The destination control system 52 may be integrated into the elevator group control or may be a separate part, e.g. a plug-in module of the elevator control. The destination control system 52 communicates with the different devices via two serial buses

54, 56 to which the different components of the elevator system are connected. To the first serial bus 54 which is connected to the elevator group control 50, the destination operating panels 24, 26, the first display 30, the second display 32 of the hall lantern means as well as the acoustic signaling 35 is connected. In this connection, also the second display 32 which indicates the moving direction of the elevator may be used as a signaling means so that when the elevator arrives at a landing, one or both arrows of the second display 32 flash up for a certain moment maybe together with an acoustic signaling of the acoustic signaling means 35.

The first serial bus 54 is further connected to the car operating panel 38 as well as to the loudspeaker 42 located in the elevator.

Via a second bus 56, preferably a serial bus, the elevator group control 50 communicates with the elevators 14, 16, 18, 20, 22 of the elevator group. The communication between the elevator group control 50 and the elevators 14-22 may happen in a way that the different components of the elevator as motor, brakes, door drives, etc. are directly controlled via the elevator group control 50 or in a way that each elevator 14-22 has its own elevator control which communicates with the different components of the elevator. In this case the communication between the elevator group control 50 and the elevator control of the different elevators 14-22 only comprises the control orders and status messages of/for the different elevators and handshaking.

The destination control system of the inventive elevator system always tries to allocate the best elevator according to evaluation principles of a cost function which evaluation principles comprise for example passenger riding time, passenger waiting time, total riding time, energy consumption, transport capacity, etc.

Of course, the elevator system may comprise several sensors as e.g. load sensors in the elevator cars, people sensors in the lobbies 12 to get information about the loading of the elevator cars and about the traffic in the elevator system. These data can be used

together with the data issued via the destination operating panels 24, 26 as well as the car operating panels 38 to improve the handling capacity of the elevator system as well as the service quality thereof.

The invention may be varied within the scope of the appended patent claims. The above-mentioned embodiments may be combined with each other as long as this is technically feasible.

Kone Corporation KON042PWO

Claims:

1. Elevator system (10) comprising at least one elevator group control (50) with a destination control system (DCS) (52), the elevator system comprising
- at least one elevator group having elevators (14 - 22) with a different destination range,
- destination operating panels (DOPs) (24, 26) at each landing (12) comprising input means for issuing destination calls,
- car operating panels (COPs) (38) located in the elevators having input means (40) for the input of destination calls,
- hall lantern means (30, 32) for each elevator indicating the moving direction of the corresponding elevator,
- signaling means (32, 35) for each elevator indicating the arrival of an elevator at the landing (12),
whereby the DCS controls the hall lantern means (30, 32) to indicate the moving direction of the elevators (14 - 22) and wherein the DCS is further configured to activate the signaling means (32, 35) when elevators of the group(s) arrive at a landing,
whereby the DCS (52) is configured to display after the issue of a destination call at the DOP a range identifier of the elevators (14 - 22) serving the destination, which range identifier (34) is indicative of the elevator's destination range, and to indicate the next arriving elevator by activation of its signaling means (32, 35) before its arrival at the landing (12),
whereby the range identifier (34) of each of the elevators of the elevator system is located in its vicinity.

2. Elevator system (10) according to claim 1, being installed on a ship, and the landings (12) are decks of the ship.

3. Elevator system according to one of the preceding claims, wherein the elevators (14 - 22) serving the destination are displayed on the DOP (24, 26) together with their range identifier (34).

4. Elevator system according to claim 3, wherein the elevators (14 - 22) serving the destination are displayed by the DOP (24, 26) in a lobby map.

5. Elevator system according to claim 3 or 4, wherein an allocated elevator (14 - 22) is displayed on the DOP (24, 26) via its individual number (28) as well as with its range identifier (34).

6. Elevator system according to one of the preceding claims, wherein the range identifier (34) is a color.

7. Elevator system according to one of the preceding claims, wherein each DOP (24, 26) and/or COP (38) comprises an ADA-keyboard (40).

8. Elevator system according to one of the preceding claims, wherein each DOP (24, 26) and/or COP (38) comprises an identifier reader (25, 39).

9. Elevator system according to claim 8, whereby upon reading an individual identifier via the identifier reader (25, 39) the destination control system (52) is configured to load pre-stored destination data from the identifier.

10. Elevator system according to one of the preceding claims, wherein the hall lantern means (30, 32) and the signaling means (32, 35) comprise a common second display (32) for the moving direction.

11. Elevator system according to one of the preceding claims, wherein the signaling means (32, 35) comprise an acoustic signaling means (35).

12. Elevator system according to one of the preceding claims, wherein the destination control system uses sensor data, e.g. load data and traffic data from the elevator group control (50) for an optimal call allocation.

13. Elevator system according to claim 12, wherein the elevator group control (50) is connected to load sensors of the elevators (14 - 22).

14. Elevator system according to claim 12 or 13, wherein the elevator group control (50) is connected to passenger sensors at the landings (12) and/or in the elevators (14 - 22).

15. Elevator system according to one of the preceding claims, wherein the destination control system (52) uses for the call allocation a cost function wherein different service parameters as e.g. passenger waiting time, passenger driving time and energy consumption are considered.

16. Elevator system according to one of the preceding claims, wherein the DCS (52) is configured to switch an immediate call allocation principle wherein an elevator is immediately allocated after a destination call has been input via the DOP, whereby the allocated elevator is displayed on the corresponding DOP (24, 26) where the destination call has been issued.

17. Elevator system according to one of the preceding claims, wherein the hall lantern means (30, 32) for each elevator is configured to indicate the position of the corresponding elevator, whereby the DCS further controls the hall lantern means (30, 32) to indicate the position the elevators (14 - 22).

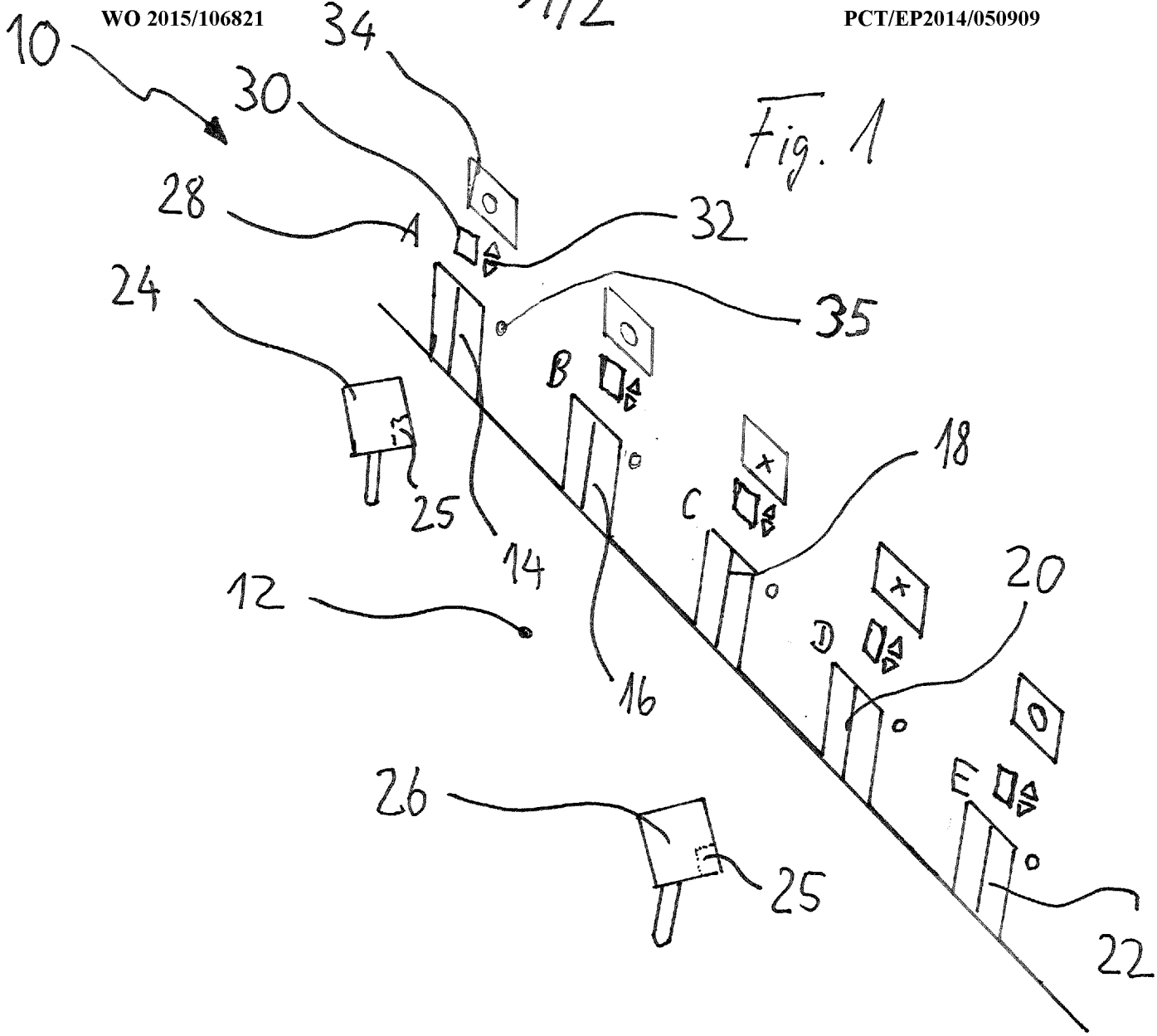
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Fig. 1

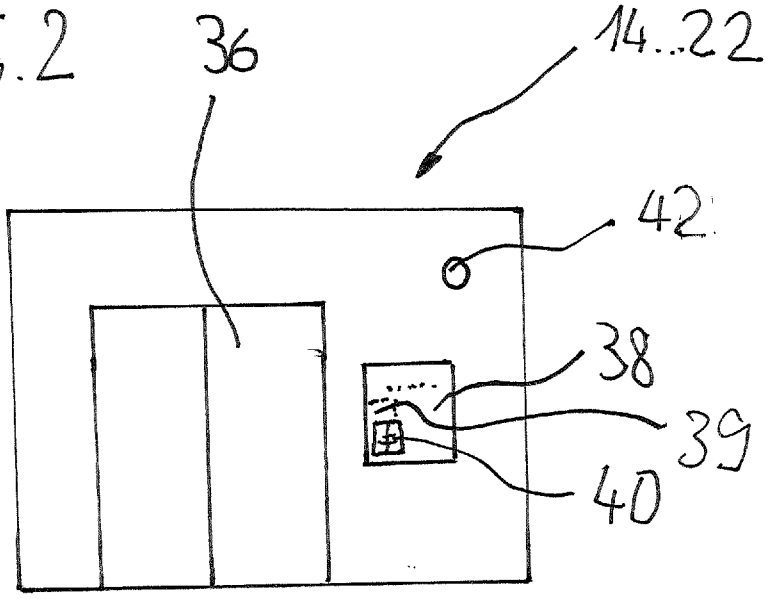
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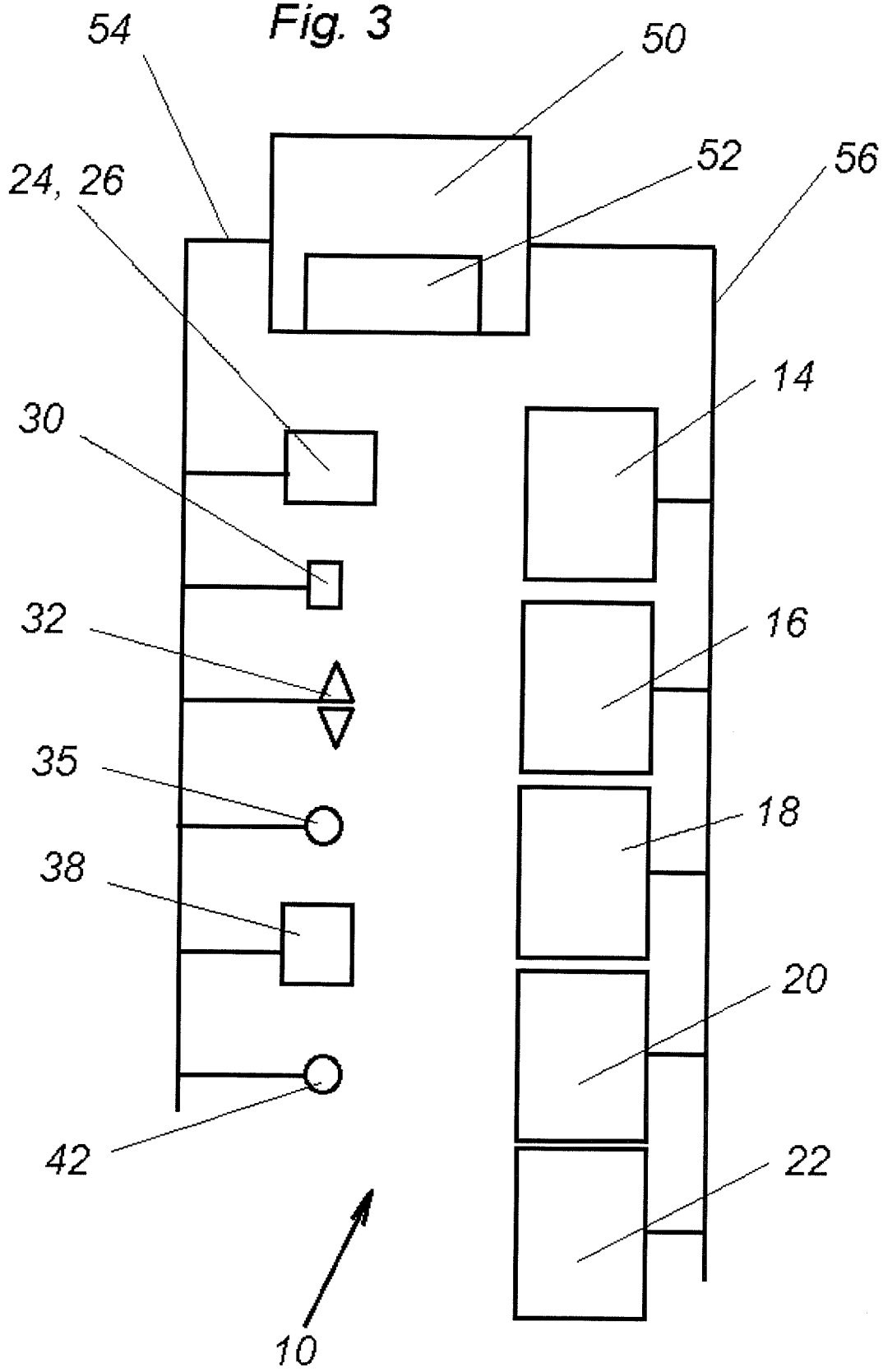
Fig. 2

Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/050909

A. CLASSIFICATION OF SUBJECT MATTER
INV. B66B1/24 B66B3/00 B66B9/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B66B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/036597 A2 (KONE CORP [FI]; SIIKONEN MARJA-LIISA [FI]; SORSA JANNE [FI]; LAIHANEN) 5 April 2007 (2007-04-05) page 3, line 6 - line 19 page 4, line 31 - line 35 page 6, line 7 - line 37 figures 2,3 page 7, line 27 - line 29 -----	1-17

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Date of the actual completion of the international search	Date of mailing of the international search report
24 September 2014	02/10/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Fiorani, Giuseppe

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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		WO 2007036597 A2	05-04-2007

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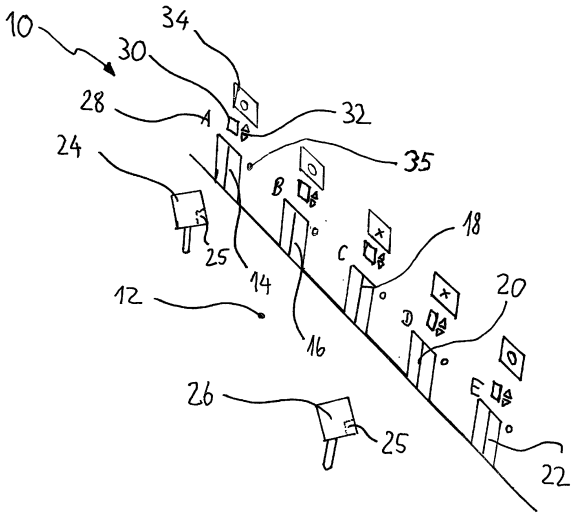
权利要求书2页 说明书6页 附图3页

(54)发明名称

包括目的地控制系统的电梯系统

(57)摘要

本发明涉及电梯系统，其提供了完善的运输能力，即使在乘客对目的地呼叫系统的使用不熟悉的情况下，例如，在游轮上。电梯控制系统10包括至少一个具有目的地控制系统(DCS)的群组控制，以及·-至少一个电梯群组，其具有目的地范围不同的电梯14-22，·-每一层站上的目的地操作面板(DOPs)24、26，·-位于电梯内的轿厢操作面板(COPs)38，·-厅门灯装置30、32，指示它们的对应电梯的移动方向，·-信号装置32、35，指示电梯到达层站12，其中该DCS52配置成邻近电梯显示服务于该目的地的电梯14-22的范围标识符并指示下一个到达的电梯。



CN 105899448 A

1.电梯系统(10),包括具有目的地控制系统(DCS)(52)的至少一个电梯群组控制(50),所述电梯系统包括:

-至少一个电梯群组,包括具有不同目的地范围的电梯(14-22),

-在每一层站(12)处的目的地操作面板(DOPs)(24、26),包括发布目的地呼叫的输入装置,

-定位于电梯内的轿厢操作面板(COPs)(38),具有用于输入目的地呼叫的输入装置(40),

-用于每一电梯的厅门灯装置(30、32),指示对应电梯的移动方向,

-用于每一电梯的信号装置(32、35),指示电梯到达层站(12),

其中所述DCS控制所述厅门灯装置(30、32)以指示所述电梯(14-22)的移动方向,并且其中所述DCS进一步配置成在群组的电梯(14-22)到达层站时启动所述信号装置(32、35),

其中所述DCS(52)配置成在发布目的地呼叫之后,在所述DOP处显示服务所述目的地的电梯(14-22)的范围标识符,所述范围标识符(34)指示所述电梯的目的地范围,并在所述电梯到达所述层站(12)之前通过启动其信号装置(32、35)来指示下一个到达的电梯,

其中所述电梯系统的每一电梯的范围标识符(34)定位于其附近。

2.根据权利要求1所述的电梯系统(10),安装在船上,并且所述层站(12)是所述船的甲板。

3.根据前述权利要求中任一项所述的电梯系统,其中服务所述目的地的所述电梯(14-22)与它们的范围标识符(34)一起显示在所述DOP(24、26)上。

4.根据权利要求3所述的电梯系统,其中服务所述目的地的所述电梯(14-22)由所述DOP(24、26)显示在大厅地图中。

5.根据权利要求3或4所述的电梯系统,其中分配的电梯(14-22)通过其独有的数字(28)以及其范围标识符(34)而显示在所述DOP(24、26)上。

6.根据前述权利要求中任一项所述的电梯系统,其中所述范围标识符(34)是颜色。

7.根据前述权利要求中任一项所述的电梯系统,其中每一DOP(24、36)和/或COP(38)包括ADA键盘(40)。

8.根据前述权利要求中任一项所述的电梯系统,其中每一DOP(24、36)和/或COP(38)包括标识符读取器(25、39)。

9.根据权利要求8所述的电梯系统,其中在通过所述标识符读取器(25、39)读取独有的标识符之后,所述目的地控制系统(52)配置成根据所述标识符来加载预先存储的目的地数据。

10.根据前述权利要求中任一项所述的电梯系统,其中所述厅门灯装置(30、32)和所述信号装置(32、35)包括用于所述移动方向的共用的第二显示器(32)。

11.根据前述权利要求中任一项所述的电梯系统,其中所述信号装置(32、35)包括声信号装置(35)。

12.根据前述权利要求中任一项所述的电梯系统,其中所述目的地控制系统使用传感器数据,例如来自所述电梯群组控制(50)的负荷数据以及客流数据,用于最佳的呼叫分配。

13.根据权利要求12所述的电梯系统,其中所述电梯群组控制(50)连接到所述电梯(14-22)的负荷传感器。

14.根据权利要求12或13所述的电梯系统，其中所述电梯群组控制(50)连接到所述层站(12)处的和/或所述电梯(14-22)内的乘客传感器。

15.根据前述权利要求中任一项所述的电梯系统，其中所述目的地控制系统(52)针对所述呼叫分配使用成本函数，其中考虑了例如乘客等待时间、乘客乘坐时间以及能量消耗的不同的服务参数。

16.根据前述权利要求中任一项所述的电梯系统，其中所述DCS(52)配置成切换即时呼叫分配原则，其中在目的地呼叫已经通过所述DOP输入之后，立即分配电梯，其中所分配的电梯显示在已经发布了所述目的地呼叫的对应的DOP(24、26)上。

17.根据前述权利要求中任一项所述的电梯系统，其中用于每一电梯的厅门灯装置(30、32)配置成指示对应电梯的位置，由此所述DCS进一步控制所述厅门灯装置(30、32)以指示所述电梯(14-22)的位置。

包括目的地控制系统的电梯系统

背景技术

[0001] 在电梯技术中仍然最常见的是称为连续呼叫分配的呼叫分配方法，由此，在每一层站(landing)提供了上/下按钮，并且在每一电梯上布置厅门灯装置以给出关于电梯的位置和移动方向的信息。当前的系统使用目的地呼叫控制，其中乘客在目的地操作面板上输入他的目的地楼层，之后该目的地控制系统立刻根据预定的成本函数来分配最佳的电梯，其显示在所述的目的地操作面板上。有时，目的地操作面板具有用于输入和显示数据的分开的设备，但输入设备和输出设备也可组合定位于随后用于输入数据并向乘客显示数据的触摸显示屏上。

[0002] 本发明特别涉及用于游轮的定制的目的地控制系统(DCS)，在其上一组里的电梯可服务于不同的甲板(楼层)，或使用者需要被引导到两个电梯群组中离他们近的一个上电梯群组。在一些登船情况下，由于要求极大的客流能力，需要平衡两组电梯群组(例如左舷和右舷)之间的客流量。

[0003] 特别是在由对目的地控制系统的使用不熟悉的使用者使用的电梯系统中，例如在游轮上，当对目的地操作面板的操作不熟悉的乘客阻塞少量目的地操作面板，由此目的地控制系统的效率根本性下降时，会产生问题，尤其在客流拥挤的时间。另一问题是尤其在有大量不同甲板的游轮上，不同的甲板由不同的电梯服务，其进一步使电梯的分配复杂化。当大量乘客试图达到他们的仅由群组的特定电梯服务的目的地时，登船阶段中会产生特殊的问题。

发明内容

[0004] 相应地，本申请的目的在于提供使用目的地控制的电梯系统，提供了高运输能力和高效率，并且还为没有经验的使用者提供了舒适的服务。

[0005] 该目的由根据权利要求1的电梯系统来解决。本申请的优选实施例是从属权利要求的主题。

[0006] 在下面的说明中，术语甲板、层站以及楼层用作同义词，指由电梯系统服务的一层。DCS是目的地控制系统的简称。DOP是目的地操作面板的简称。COP是轿厢操作面板的简称。

[0007] 根据本发明，电梯系统不仅包括与目的地呼叫控制相关的特征，即层站处的目的地操作面板，电梯系统还包括允许在电梯内发布轿厢呼叫的电梯内的轿厢操作面板，用于每一电梯的厅门灯装置，其指示对应电梯的位置和移动方向，以及发信号(signaling)装置，其可与厅门灯装置组合用于每一电梯以指示电梯到达层站楼层。轿厢操作面板、厅门灯装置以及发信号装置是连续呼叫分配系统的典型特征。相应地，电梯系统将目的地控制系统效率提高的优点与连续呼叫操作系统的便利操作组合，该连续呼叫操作系统可由不熟悉目的地控制系统操作的无经验者使用。此外，每一电梯因此具有一范围标识符，其指示电梯服务的一定目的地范围，其帮助发现到特定目的地的正确电梯。因此，一个范围标识符(例如颜色)对具有相同的目的地范围(相同的服务层站)的所有电梯都是相同的。

[0008] 本发明电梯系统的目的地控制系统配置成根据连续呼叫分配原则但作为目的地控制系统来分配电梯组的电梯。这是指在通过DOP得到目的地呼叫后，通过指示或显示指示由对应的电梯服务的目的地范围的对应范围标识符，目的地控制系统通过DOP显示(一组或多组电梯中)服务于该目的地的电梯。此外，目的地控制系统控制厅门灯装置以指示所有电梯的位置和移动方向，而目的地控制系统进一步配置成在至少一个电梯组的任意电梯到达层站时，启动发信号装置。DOP可选择的也配置成在即时呼叫分配中指示所分配的电梯。当在电梯系统中没有大量客流量时，可使用这个分配模式。

[0009] 在已经通过DOP告知范围标识符之后，乘客可寻找服务于他的目的地的下一个合适的电梯(通过范围标识符)，而厅门灯装置向他指示合适的电梯的哪一个将到达，然后其由发信号装置指示。这利于使用包括还由无经验的乘客使用的目的地范围不同的电梯的电梯系统。这个范围标识符可实现，例如在每一电梯上方的显示屏上直接指示服务的目的地范围。该范围标识符还可为简单的符号或颜色，其对目的地范围相同的所有电梯都是一样的。

[0010] 指示电梯到达层站的每一电梯的发信号装置，可为声学的或视觉的信号装置。该发信号装置还可为组合的发信号装置，其给出电梯到达层站的声学信号以及视觉信号。在这方面，该发信号装置可与厅门灯装置组合。通过这个清楚的信号，在大厅等待的乘客通过范围标识符，清楚地知道电梯的到达、电梯的移动方向以及还有对应的电梯的目的地范围。相应地，即使他们没有在电梯系统的目的地的操作面板上发布目的地呼叫，他们也能进入正确的电梯并通过定位于电梯内的轿厢操作面板发布他们的目的地呼叫。通过这个措施，本发明的电梯系统提供了目的地控制系统与被称作老式上/下按钮电梯系统的连续呼叫分配的一种混合系统，并根本性地提高了电梯系统的运输能力。

[0011] 因此，本发明具有混合分配系统(连续目的地控制)的电梯系统，提供了最佳效率，因为它比老式连续呼叫分配系统为电梯控制提供了更多的信息，在老式连续呼叫分配系统中，不发布目的地楼层，并且必须根据统计数据评估。另一方面，本发明的电梯系统为对目的地控制系统不熟悉的乘客，或者在大厅太拥挤而不能正常使用DCS的即时呼叫分配的情形下，提供了更好的乘客舒适度。相应地，本发明的电梯系统还在大厅拥挤的拥挤情形或客流高峰情形下提供了完善的运输效率，这些情形正常情况下导致传统的目的地控制系统效率的降低。本发明优选配置成用于船，例如具有大量甲板的游轮，这些甲板由电梯系统的不同电梯服务。在这些游轮上，必须运输诸如儿童、老年人、残疾人的多种无经验的人，其中，在客流高峰情形下，例如登船、午餐或晚餐时间，发生客流拥挤，其使单纯的目的地控制系统的操作困难。

[0012] 本申请简化了DCS的使用，考虑了以不同数量的群组(单人、双人、家庭、朋友群)旅行的很多类型的使用者(成人、儿童、老年人、残疾人)，这些使用者可能对DCS或者甚至群组中的电梯不熟悉。相应地，本发明提高了DCS的效率，改善了电梯系统的能力和终端使用者/客户的舒适度。

[0013] 由于连续呼叫分配，本发明的另一优点是经验少的电梯使用者的使用的简化以及电梯的有效使用。另外，本发明简化了层站呼叫站布置结构，这样如果群组中的电梯具有不同的上/下甲板，则不需要额外的呼叫按钮(FEB/FET)。

[0014] 本发明提供了下列优点：

[0015] 1)在电梯服务于不同的甲板时,将使用者引导到服务于他们的目的甲板的正确电梯。

[0016] 2)如果群组服务于不同的甲板,则将使用者引导到正确的电梯群组。

[0017] 3)将使用者引导到特定的电梯群组以平衡两个(或更多个)群组的客流。

[0018] 4)考虑宽范围的使用者,有效使用游轮上的DCS(以及电梯)。

[0019] 通过在DOP内示出对服务于该目的地的电梯是共同的范围标识符,该范围标识符可为例如,某些颜色、文字或图画,无经验的乘客可立即认出用于他的目的地的正确电梯。具有上/下灯的正规厅门灯装置、以及具有声学信号(诸如锣)和/或视觉信号(诸如上/下灯)的发信号装置,发信号通知正到达的电梯。当其到达时,目的地轿厢呼叫自动发送给电梯而信号装置变亮。如果提供了若干电梯群组,则DOP可能通过大厅地图,会示出正确的电梯群组。在电梯系统内提供了多个电梯群组的情况下,可提供一个多群组控制或者布置若干群组控制,通过双向通讯相互作用以分配群组中的一个群组的最佳电梯。在这方面,DCS与群组控制结合提供了服务成本评估,例如,预期的等待时间,其然后决定服务的电梯群组或一个群组中的多个电梯,并通知使用者/乘客。

[0020] 关于将使用者引导到特定的电梯群组以平衡两个(或更多个)群组之间的客流,其可能或者通过DOPs(优选是轻便的以容易且快速地安装在舷梯上),或者当所有的使用者进入舷梯时必须刷他们的个人标识符(通常是ID卡)时通过船的通道控制系统,将目的地呼叫发送给电梯群组控制。通道控制系统可发送使用者的船舱所在的目的地楼层或仅发送层站呼叫。后一选择是优选的,因为从舷梯到电梯大厅的长步行距离(步行慢的旅行者很可能是30-60秒)以及因为他们可能想要直接到餐厅/游泳池,而非他们的船舱。这个引导可实施为天花板上的单独的显示器、或者由接收指令以将乘客引导到哪里的人员手动引导。无论如何,这个功能更像人群探测,而且引导还针对人群,例如“下个电梯将到达大厅左侧”,而非针对个人。在这里还可使用人群探测传感器,代替目的地呼叫。

[0021] DCS可使用连续的DCS呼叫分配,由此仅通知使用者服务于他的目的地的多个电梯,而在服务于他的目的地的下一个电梯到达层站之前,通过发信号装置通知。原则上还可使用即时分配,但使用者以及使用者群组会过于降低其效率。

[0022] 在本发明的优选实施例中,具有相同目的地范围的电梯标记有同样的范围标识符,而被分配的电梯通过其范围标识符在目的地操作面板上指示。通过这个措施,乘客知道哪个电梯服务于他的目的地。之后,他可以等待这些电梯的下一个在他的目的地方向到达,这由厅门灯装置和发信号装置指示。因此,目的地呼叫控制和连续呼叫控制的优点以非常有效的方式组合,这样乘客仅需集中在服务于他的甲板/层站的正确电梯上。

[0023] 范围标识符的提供利于寻找服务于他们的甲板或层站的正确电梯,因为这样的范围标识符可以做得很容易注意,例如文字的,数字或者更好的,颜色。如果使用颜色作为范围标识符,这个颜色可由乘客容易地记住以容易地发现他们的服务于他们的目的楼层或甲板的电梯。

[0024] 范围标识符设置在电梯的附近,例如在其顶部或侧边或围绕其层站门。如果范围标识符示出在显示器上,则服务于若干不同目的地范围的电梯的群组是可选择的/可变化的。范围标识符还可为数字或颜色,其画在层站门设置在该处的墙上。这种类型的范围标识符可由乘客容易地记住。

[0025] 电梯系统可包括一个或多个电梯群组，由此一个群组的多个电梯或不同群组的多个电梯服务于不同的目的地。在设置多个群组的情况下，可设置一个多群组控制，在其中组合了用于不同电梯群组的DCS。替代的，可设置若干电梯群组控制，其相互作用以在群组之间引导乘客。

[0026] 在本发明的优选实施例中，范围标识符被指示在可由电梯控制或目的地控制系统控制的显示器上。

[0027] 通过显示在电梯上方的显示器上的这个范围标识符，可使用任意想要类型的范围标识符，使得范围标识符可适用于电梯系统的不同用户群组。这特别是真的，如果船用在世界不同的区域中，这样范围标识符适用于不同的语言。

[0028] 优选地，目的地操作面板以及轿厢操作面板包括ADA键盘，即十进制键盘，残疾人也可容易地操作它。这利于小孩和残疾人使用电梯系统。

[0029] 优选的，目的地操作面板以及轿厢操作面板包括标识符读取器，其启动目的地控制系统以自动读取已经呈现ID标签的乘客的目的地。该标识符读取器可为卡读取器或RFID读取器或任意其它对应的标识标签读取器。

[0030] 本发明电梯系统能便利地叠加特殊的呼叫模式，例如紧急呼叫模式、VIP呼叫模式，VIP呼叫模式通过个人标识符的使用，在对应的服务模式中自动切换目的地控制系统，由此对应的乘客具有一定的预定优先权。

[0031] 当然，本发明混合电梯系统不仅应用于大型游轮，还应用于不同类型的人以及经验较少的人使用电梯系统的其它地方，例如商场、地铁站以及机场。

[0032] 应当再次强调，本发明电梯系统没有上/下按钮。

[0033] DCS可从连续呼叫分配切换为即时呼叫分配，例如在安静的时候，例如当一对电梯暂停服务(晚间)时。在这个即时分配中，在DOP处发布其目的地呼叫后，在DOP上立即告知乘客他的所分配的电梯。

附图说明

[0034] 此后在公开的附图的帮助下示意性描述本发明。

[0035] 在这些附图中：

[0036] 图1示出电梯大厅的透视图，其包括具有两个不同目的地范围的多个电梯，

[0037] 图2示出从电梯内部朝向轿厢门和轿厢操作面板的视图，以及

[0038] 图3为电梯控制的示意流程图，其具有控制连续呼叫分配系统的功能的目的地控制系统。

具体实施方式

[0039] 图1示出电梯系统10的层站的层站大厅12的透视图，从该大厅具有到至少五个电梯14、16、18、20、22的通道。在大厅12中，有两个目的地操作面板24、26，其包括发布目的地呼叫的输入装置，例如ADA键盘，以及显示器和/或触摸屏，以向乘客指示服务这个发布的目的地的适用电梯，优选在已经发布目的地呼叫后马上指示。五个电梯14-22的每一个具有单独的标识符28，在这个实施例中为文字A-E。每一个电梯在其顶部具有一个厅门灯装置，其包括第一显示器30，用于电梯的实际位置，以及第二显示器32，用于指示电梯的移动方向。

[0040] 此外，每一电梯具有范围标识符显示器34，该范围标识符指示由该电梯服务的一定目的地范围。该范围标识符例如可为文字、数字或颜色，或在指示的实施例中为圆的或十字的的图形。每一范围标识符代表对应的电梯的一定的目的地范围，由此在DOP上以及最终在电梯大厅的任意位置，有示出范围标识符和服务的目的地的相互关系的信息。在描述的实施例中，范围标识符被显示在范围标识符显示器34上，其甚至可能直接指示对应电梯的目的地范围，例如“甲板10到24”。

[0041] 在图1中指示的所有设备被连接到电梯控制或电梯群组控制上，其包括如图3所示的目的地控制系统。相应地，本发明电梯系统基于目的地操作面板24和26，在没有上/下按钮的情况下执行连续目的地控制，由此发布目的地呼叫，而服务于该呼叫的可能的电梯以它们的范围标识符被显示。目的控制系统还控制厅门灯装置的第一显示器30和第二显示器32、以及目的地范围显示器34、以及指示电梯到达层站的声学发信号装置35。

[0042] 图2示出从电梯14-22的内部到轿厢门36的视图。在轿厢门36侧面，轿厢操作面板(COP)38定位于轿厢壁内，通过其可输入COP目的地，例如，通过设置在所述COP38的触摸屏的十进制键盘40或通过单独的键盘。如果轿厢操作面板38是触摸屏，则ADA键盘40可显示在面板上。轿厢操作面板38还可指示移动方向上的电梯的下一目的地。此外，声学发信号装置42，通常为扬声器或锣，设置在轿厢内以向特殊的视觉残疾人通知轿厢的目的地和轿厢的下一站。

[0043] 图3示出包括目的地控制系统52的轿厢群组控制50，其中执行即时呼叫分配，即时呼叫分配通常与目的地呼叫系统一起。目的地控制系统52可整合进电梯群组控制或者可为单独的部件，例如电梯控制的插入模块。目的地控制系统52通过电梯系统的不同部件连接到的两个串行总线54、56与不同设备进行通信。在这个连接到电梯群组控制50的第一串行总线54上，连接有目的地操作面板24、26、厅门灯装置的第一显示器30、第二显示器32以及声学发信号装置35。在这个连接中指示电梯移动方向的第二显示器32可用作发信号装置，使得当电梯到达层站时，第二显示器32的一个或两个箭头与声学发信号装置35的声学信号一起闪烁一段时间。

[0044] 第一串行总线54进一步连接到轿厢操作面板38以及连接到定位于电梯内的扬声器42。

[0045] 通过第二总线56(优选是串行总线)，电梯群组控制50与电梯群组的电梯14、16、18、20、22进行通信。电梯群组控制50和电梯14-22之间的通信可以这样的方式发生：电梯的不同部件(诸如电机、刹车、门驱动等)直接由电梯群组控制50控制，或以这样的方式发生：每一电梯14-22具有其独有的电梯控制，其与电梯的不同部件进行通信。在这种情况下，电梯群组控制50和不同电梯14-22的电梯控制之间的通信仅包括不同电梯的控制顺序和状态信息以及信息交换(handshaking)。

[0046] 本发明电梯系统的目的地控制系统通常试着根据成本函数的评估原则来分配最好的电梯，该函数原则包括例如乘客乘坐时间、乘客等待时间、总的乘坐时间、能量消耗、运输能力等。

[0047] 当然，电梯系统可包括若干传感器，例如轿厢内的负荷传感器、大厅12内的人传感器，以得到关于轿厢负荷和关于电梯系统的客流的信息。这些数据可与通过目的地操作面板24、26以及轿厢操作面板38发布的数据一起使用以改善电梯系统的处理能力以及其服务

质量。

[0048] 本发明可在附加的专利权利要求的范围内变化。只要技术上可行，上面提到的实施例可彼此组合。

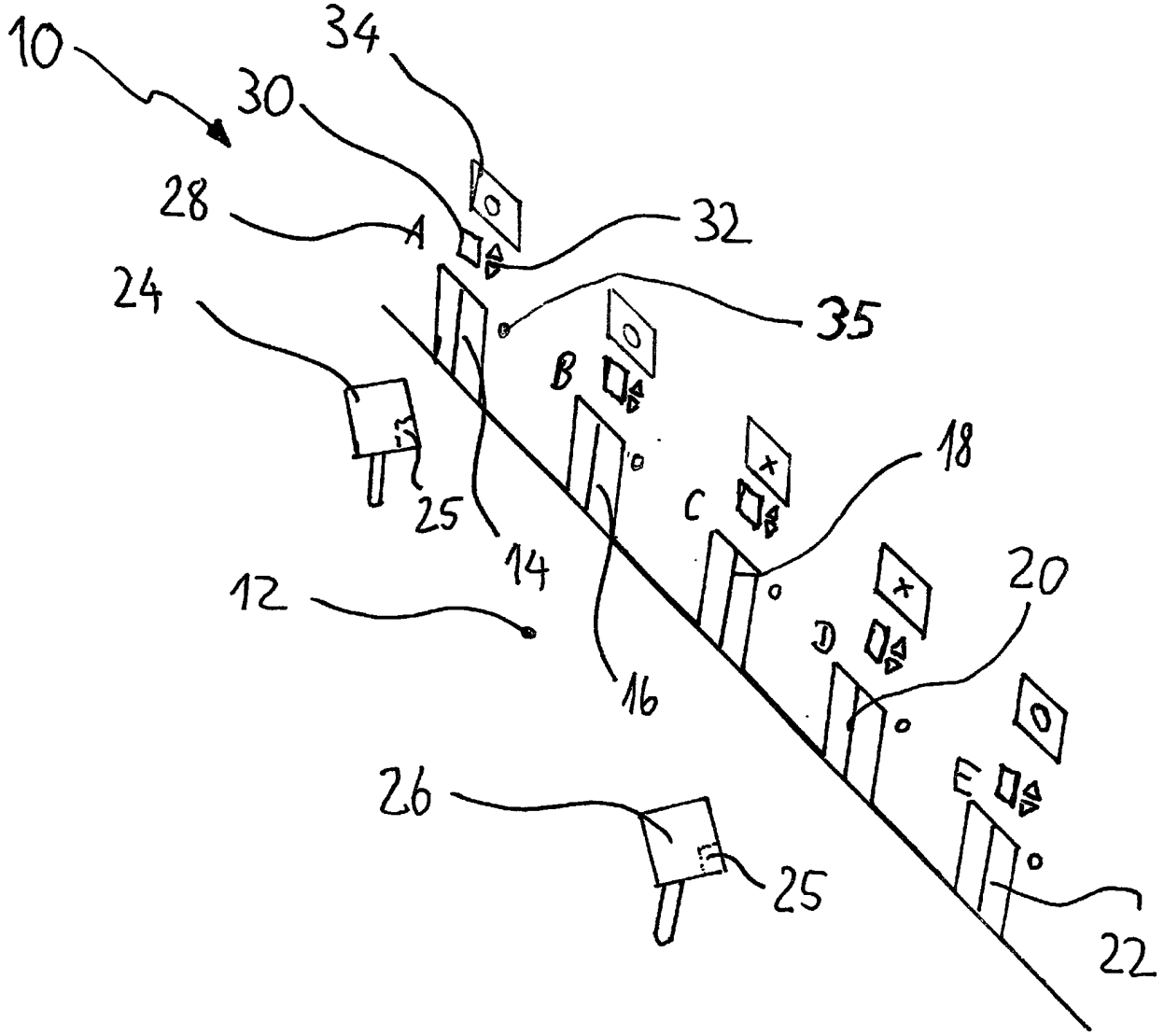


图1

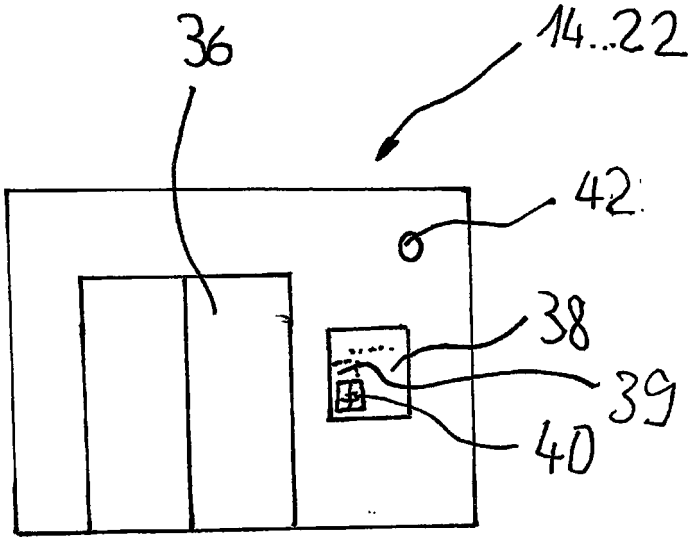


图2

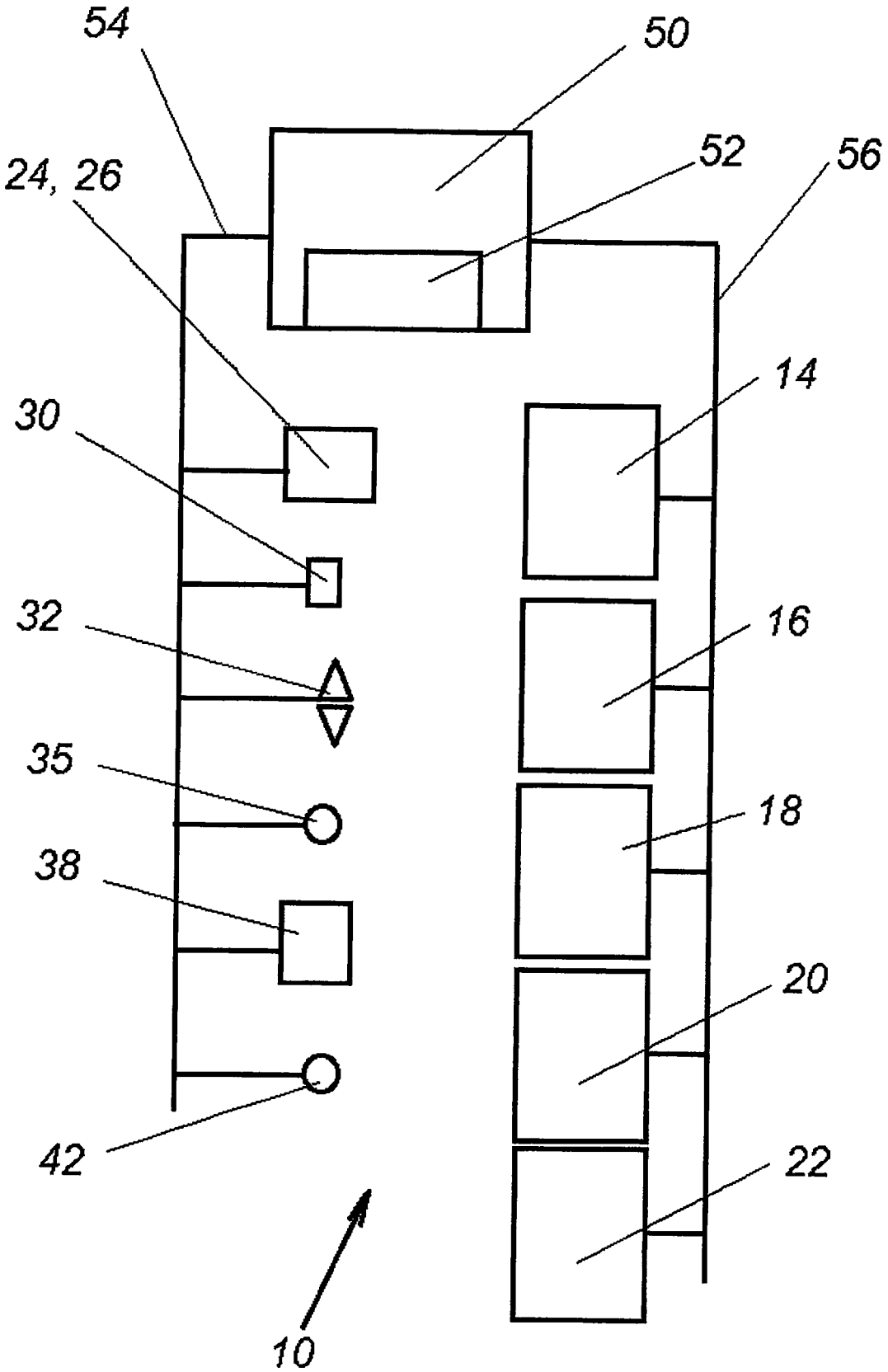


图3