

AUSTRALIA

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NOTICE OF ENTITLEMENT

(To be filed before acceptance)

We, INVENTIO AG, of Seestrasse 55, CH-6052 Hergiswil, Switzerland, being the applicant in respect of Application No. 70205/91 state the following:-

The Person nominated for the grant of the patent:

has entitlement from the actual inventor:

INVENTIO A.G. A.

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by assignment.

The person nominated for the grant of the patent:

is the applicant of the basic application listed on the patent request form.

INVENTIO A.G. A.

The basic application listed on the request form:

is the first application made in a Convention country in respect of the invention.

By our Patent Attorneys,
WATERMARK PATENT & TRADEMARK ATTORNEYS


.....
L. J. Dyson

Registered Patent Attorney

November 16, 1992
.....

(CONVENTION. By one or more persons and/or a Company.)

Form 4.

COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1969

633174

CONVENTION APPLICATION FOR A PATENT

(1) Here
insert (in
full) Name
or Names of
Applicant or
Applicants,
followed by
Address(es).

XI (1) INVENTIO AG
We
of CH-6052 Hergiswil NW, Switzerland

(2) Here
insert Title
of Invention.

hereby apply for the grant of a Patent for an invention entitled: (2)
GROUP CONTROL FOR LIFTS WITH IMMEDIATE ALLOCATION OF TARGET CALLS IN
DEPENDENCE ON THE CALL ENTRY LOCATION ON A STOREY

(3) Here insert
number(s)
of basic
application(s).

which is described in the accompanying complete specification. This application is a
Convention application and is based on the application numbered (3)
00358/90-6

(4) Here insert
Name of basic
Country or
Countries, and
basic date or
dates.

for a patent or similar protection made in (4) Switzerland
on 5th February 1990

My
Our address for service is WATERMARK PATENT & TRADEMARK ATTORNEYS
290 Burwood Road, Hawthorn, Victoria, Australia.

DATED this 1st day of February 19.91.....

(5) Signa-
ture(s) of
Applicant(s)
or
Seal of
Company and
Signatures of
its Officers as
prescribed by
its Articles of
Association.

(5) INVENTIO AG

by

Stephen K. Plymin

Registered Patent Attorney

To: THE COMMISSIONER OF PATENTS.



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(12) PATENT ABRIDGMENT **(11) Document No. AU-B-70205/91**
(19) AUSTRALIAN PATENT OFFICE **(10) Acceptance No. 633174**

- (54) Title
**GROUP CONTROL FOR LIFTS WITH IMMEDIATE ALLOCATION OF TARGET CALLS IN
DEPENDENCE ON THE CALL ENTRY LOCATION ON A STOREY**
- International Patent Classification(s)
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- (21) Application No. : **70205/91** (22) Application Date : **04.02.91**
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358/90 **05.02.90** **CH SWITZERLAND**
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- (56) Prior Art Documents
US 4915197
US 4878562
US 4852695
- (57) Claim

1. Group control for lifts with immediate allocation of target calls in dependence on the call entry location on a storey, with call-registering and indicating equipments which are arranged on the storeys and display a keyboard for the entry of calls for desired target storeys, with call stores which are associated with the lifts of the group and connected with the call-registering and indicating equipments, wherein - on the entry of a call on a storey - a call identifying the entry storey and a call identifying the target storey are stored in the call stores with load stores in which the number of the persons present in the respective lift cage is stored for each storey, with travelling time stores, cage position registers and computers associated with the lifts of the group as well as with a comparison equipment, wherein the computer computes operating costs corresponding to the waiting times of passengers from data specific to the lift, and with an operating costs register connected with the computer and the comparison equipment and with allocation stores associated with the call store, wherein the operating costs are compared one with the other and the call concerned is allocated to that lift cage through entry of an allocation instruction into the allocation stores which displays the lowest operating costs, and

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wherein the lift concerned and its position is indicated on an indicating field of the actuated call-registering and indicating equipment immediately after the call allocation, characterised thereby,

- that a further store, in which the times needed by a passenger for the paths between the respectively actuated call-registering and indicating equipment and the shaft doors of the lifts are stored, is provided for each lift,
- that a comparator is provided, which is connected at the input side with the further store and the travelling time store,
- that the operating costs register is connected by way of a switching equipment to the comparison equipment and
- that the comparator at the output side stands in connection with the switching equipment,
- wherein for the case of a lift cage travelling time, which is stored in the travelling time store and dependent on the cage position and the call input storey, being less than the time needed by a passenger to reach the shaft door of the lift concerned, the switching equipment switches the operating costs register away from the comparison equipment and the lift is excluded from the comparison.

633174

Form 10

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-69

COMPLETE SPECIFICATION

(ORIGINAL)

Class

Int. Class

Application Number:

Lodged:

Complete Specification Lodged:

Accepted:

Published:

Priority :

Related Art :

Name of Applicant :

INVENTIO AG

Address of Applicant :

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Address for Service :

**WATERMARK PATENT & TRADEMARK ATTORNEYS.
LOCKED BAG NO. 5, HAWTHORN, VICTORIA 3122, AUSTRALIA**

Complete Specification for the invention entitled:

GROUP CONTROL FOR LIFTS WITH IMMEDIATE ALLOCATION OF TARGET CALLS IN
DEPENDENCE ON THE CALL ENTRY LOCATION ON A STOREY

The following statement is a full description of this invention, including the best method of performing it known to :- US

Description:

Group control for lifts with immediate allocation of target calls in dependence on the call entry location on a storey

The invention concerns a group control for lifts with immediate allocation of target calls in dependence on the call entry location on a storey, with call-registering and indicating equipments, which are arranged on the storeys and display a keyboard for the entry of calls for desired target storeys, with call stores, which are associated with the lifts of the group and connected with the call-registering and indicating equipments, wherein - on the entry of a call on a storey - a call identifying the entry storey and a call identifying the target storey are stored in the call stores, with load stores, in which the number of the persons present in the respective lift cage is stored for each storey and with travelling time stores and cage position registers associated with the lifts of the group, according to the classifying clause of the patent claim 1.

A group control, which is similar to the equipment according to the classifying clause and which uses the least waiting time of all passengers as criterion for the allocation of the cages to the entered calls, has become known by EP-A-0 356 731. In this control, the travel targets can be entered already on the storeys, for example through call-registering and indicating equipments proposed by the EP-A-0 ~~325 583~~ ^{320 983}. Immediately after the registration and transmission of a call into a call store divided according to entry and target storeys, a computer in the form of a



microprocessor ascertains a sum, which is called operating costs and corresponds to the waiting time which would arise for the passengers on the call being served, for each cage from data specific to the lift. The operating costs are transferred immediately after the computation into a costs register and then compared immediately with the operating costs of the other lifts by means of a comparison equipment. In this case, an allocation instruction is stored in an allocation store of that lift which displays the least operating costs. Immediately after the allocation of cage to call has taken place in this manner, the lift concerned and its position are indicated in an indicating field of the actuated call-registering and indicating equipment so that the passenger can move to the associated shaft door in time.

Optimum results in respect of lowest waiting times of the passengers can be achieved by the afore described group control. In larger installations with several lifts, it must however be reckoned with that a passenger needs more or less time for the path to the shaft door of the allocated lift according to the position of the actuated call-registering and indicating equipment. For this reason, the door of the lift must after arrival of the cage concerned be kept open sufficiently long that the respectively furthest passenger can still board. In the case of cages arriving early, there results not only a loss of time for the persons situated in the cage, but also for the entire system so that the operating quality and quantity is impaired.

The invention is based on the task of improving the control named in the state of the art in such a manner that cages, in which a loss of time would arise through doors being kept open for too long a time, are excluded

from the call allocation.

This problem is solved by the invention characterised in the patent claim 1. In this case, a store, in which times are stored, which a passenger needs for the paths between the respectively actuated call-registering and indicating equipment and the shaft doors of the lifts, is provided for each lift. A comparator connected with the store compares the time associated with the actuated call-registering and indicating equipment with the travelling time of the cage to the call entry storey. If the travelling time is smaller than the time needed by the passenger to get to the shaft door of the lift concerned, a switching equipment connected to the output of the comparator becomes effective in such a manner that the operating costs cannot be fed to the comparison equipment and the lift concerned is excluded from the call allocation.

The advantages achieved by the invention are to be seen in that a passenger reaches the shaft door of the selected lift always before arrival of the cage so that no additional time losses for the entire system arise and the operating quality achievable by the applied call allocation method is not impaired.

The invention is explained more closely in the following by reference to an example of embodiment illustrated on the drawing. There show:

- Figure 1 a schematic illustration of the group control according to the invention for two lifts of a lift group,
- Figure 2 a schematic illustration of a part, associated with a lift, of the group control according to Figure 1,
- Figure 3 call-registering and indicating equipments arranged

on a storey for a lift group consisting of four lifts,

Figure 4

a schematic illustration of stores associated with the lifts for the times which a passenger needs for the paths between the call-registering and indicating equipments and the shaft doors, and

Figure 5

a circuit arrangement for the ascertaining of a call-registering and indicating equipment actuated on a storey.

In the Figure 1, two lifts of a lift group are denoted by C and D, wherein - for each lift - a cage 2 guided in a lift shaft 1 is driven by a hoist machine 3 by way of a hoist cable 4 and fifteen storeys E0 to E14 are served. The hoist machine 3 is controlled by a drive control known from EP-B-0 026 406, wherein the target value generation, the regulation functions and the stop initiation are realised by means of a microcomputer system 5, which stands in connection with measuring and setting members 6 of the drive control. The microcomputer system 5 beyond that computes a sum, which is also called operating costs, corresponds to the waiting time of all passengers and is made the basis of the call allocation procedure, as is for example known from the EP-A-0 356 731. The cage 2 displays a load-measuring equipment 7, which is likewise connected with the microcomputer system 5. Call-registering and indicating equipments 8, which are for example known from the EP-A-0 320 583 and which display decade keyboards, by means of which calls for travels to desired target storeys can be entered, are provided on the storeys. For the method of the programmed entry assumed by way of example, the call-registering and

indicating equipments 8 are connected by way of an address bus ab and a data input conductor DL with the microcomputer system 5. The call-registering and indicating equipments 8 of a storey stand in connection one with the other and can be associated with more than one lift of the group, wherein for example those of the lift C are connected by way of coupling members in the form of multiplexers 9 to the microcomputer system 5 of the lift D. The microcomputer systems 5 of the individual lifts of the group are connected one with the other by way of a comparison equipment 10, which is known from the EP-B-0 050 304, and a party line transmission system 11, which is known from the EP-B-0 050 305, and together with the call-registering and indicating equipments 8 form a group control similar to the afore mentioned EP-A-0 356 731. The call-registering and indicating equipments 8 are furthermore described by way of conductors L to the microcomputer systems 5 as described more closely in the following. A signal, by which the microcomputer systems 5 can identify an actuated call-registering and indicating equipment 8, can be transmitted by way of the conductors L. The part, illustrated schematically in the Figure 2, of the microcomputer system 5, which is associated for example with the lift A, displays a call store RAM1 and a first and a second allocation store RAM2 and RAM3, which for each direction of travel possess storage places corresponding to the number of the storeys, wherein merely the stores associated with the upwards calls are illustrated. The call store RAM1 consists of a first and a second store RAM1.1 and RAM1.2, wherein the calls identifying the respective entry storey are stored in the first store RAM1.1 and the calls identifying the target storeys are stored in the second store RAM1.2 and wherein the first allocation store RAM2 is

associated with the first store RAM1.1 and the second allocation store RAM3 is associated with the second store RAM1.2. An operating costs register intended for the storage of the operating costs is denoted by R1 and a cage position register is denoted by R2. A selector R3 in the form of a further register forms addresses which correspond to the storey numbers and by means of which the storage places of the stores RAM1.1, RAM1.2, RAM2 and RAM3 can be addressed. While the selector R3 each time indicates that storey, at which the travelling cage 2 could still stop, the cage position register R3 each time indicates that storey, in the region of which the cage 2 is actually situated. The call store RAM1 as well as the first and second allocation stores RAM2 and RAM3 are read-write stores, which are connected with the bus SB of the microcomputer system 5. The calls stored in the call store RAM1 according to the example of Figure 2 and the allocation instructions stored in the allocation stores RAM2 and RAM3 are identified symbolically by "1", wherein allocated calls (dashed connecting line) are concerned in the case of the storeys E2, E3, E5 and E11 and new, not yet allocated calls (hatched fields) are concerned in the case of E10 and E13. A load store is denoted by 12, a door time store is denoted by 13 and a travelling time store is denoted by 14, which stores are likewise connected with the bus SB of the microcomputer system 5. The stores 12, 13 and 14, which are known from the EP-A-0 356 731 cited above, are read-write stores, in which data for the operating costs computation are stored. Load values in the form of a number of persons are stored for each storey in the load store 12, who are situated in the respective cage during a future stop or the travel past a storey, and can be calculated on the basis of the entered calls. In this case, load values formed from faulty call entries

can be corrected through comparison with the values ascertained by the load-measuring equipment 7. The door opening and closing times of the lift concerned are stored for each storey in the door time store 13, whilst the travelling times of the lift cage concerned between each time a certain storey and each other storey are stored in the travelling time store 14. Denoted by 15 is a further store, which is connected with the bus SB and in which the times needed by a passenger at a storey for the paths between the respectively actuated call-registering and indicating equipment 8 and the shaft doors of the lifts are stored. A comparator 16, which is for example formed by the processor of the microcomputer system 5, at the input side stands in connection with the travelling time store 14 and the further store 15. The operating costs register R1 is connected by way of a switching equipment 17 in the form of three-state buffers with the comparison equipment 10, wherein the activating connections of the three-state buffers are connected to the output of the comparator 16.

The shaft doors, which are arranged on a storey, of the lifts A, B, C and D of the lift group assumed by way of example are denoted 18 in the Figure 3. The shaft doors 18 may in this case have the same spacings one from the other, for which the call-registering and indicating equipments are arranged each time in the centre between two shaft doors 18. The empirically derived time, which a passengers needs for the path between the call-registering and indicating equipment 8 actuated by him and the respectively neighbouring shaft door 18, is denoted by t . In the arrangement chosen by way of example, a passenger would need a time of $5t$ to the shaft door 18 concerned on allocation of the lift D for actuation of the call-registering and indicating equipment 8 between the lifts A and B.

The further stores 15, associated according to Figure 4 with lifts A, B, C and D, display a number of storage places corresponding to the number of call-registering and indicating equipments 8 provided on a storey. Corresponding to the exemplary arrangement of the Figure 3, the further store 15 each have three storage places which are denoted in the sequence of the lifts by AB, BC and CD. The stored times, entered in the Figure 4, result from the definition of the time t given in the description relating to Figure 3, wherein the time $5t$ mentioned by way of example is to be found in the storage place AB of the further store 15 associated with the lift D.

Denoted by 20 in the Figure 5 are multiplexers which are associated with the lifts and call-registering and indicating equipments 8 of a storey and which display a number of inputs corresponding to the number of call-registering and indicating equipments 8 of a storey, wherein those inputs of all multiplexers 20 are connected together, which are respectively associated with the same call-registering and indicating equipment 8. A respective one input of the multiplexers 20 is connected with the output of an AND-gate 21, the inputs of which are connected to outputs Q of storage cells 22 of the associated call-registering and indicating equipments 8. The multiplexers 20 are connected to the address buses ab of the associated microcomputer systems 5 and at the output side stand in connection (Figure 2) by way of the conductor L with the further store 15 of the associated microcomputer system 5. The other outputs Q of the storage cells 22 are, as is known from the EP-A-0 320 583 or EP-B-0 246 395, connected with inputs of multiplexers 23 associated with the respective call-registering and indicating equipments 8 for the purpose of the interrogation of calls entered on a storey.

The afore described group control operates as following:

After entry of call, for example according to Figure 2, on storey E10 for storey E13, a call identifying the entry storey is transferred into the first store RAM1.1 and a call identifying the target storey is transferred into the second store RAM1.2 of the call stores RAM1 of all lifts. Thereafter, the multiplexers 20 are interrogated, for which it is assumed that the call from storey E10 was entered by means of the call-registering and indicating equipment 8 arranged between the lifts A and B. In this case, the output of the AND-gate 21 concerned and thereby also the inputs of all multiplexers 20 associated with the actuated call-registering and indicating equipment 8 become logic "0" (Figure 5). On the appearance of the address associated with the respective input, the microprocessors of the microcomputer systems 5 interpret the signal "0", which is then carried on the conductors L, in the sense that the content of the storage place AB of the further store 15 must be fed to the one input of the comparator 16 (Figure 4, 2). Thereafter, the associated travelling time is taken out of the travelling time store 14 in dependence on the cage position contained in the cage position register R2 and the address of the call entry storey E10 and fed to the other input of the comparator 16. Let it now be assumed that the travelling time of the cage of the lift D is less than the time 5t stored in the storage place AB of the further store 15. In this case, the logic state at the output of the comparator 16 changes in such a manner that the switching equipment 17 is switched into a high resistance state and the operating costs register R1 is separated from the comparison equipment 10. After the load values of the load stores 12 have been corrected in accordance with the newly entered call on storey E10, the

operating costs for the entry and target storey of the new call are computed for all lifts, for which a formula is used for example, which has become known by the already named EP-A-0 356 731. In this case, it is presumed that, due to the possibly new stops taking place at the entry and target storey, not only waiting times of the new passengers would arise, but also of all traffic participants of already allocated calls of the lift concerned. As already mentioned in the preceding, the computer takes door opening and closing times from the door time store 13, the number of the persons already situated in the cage from the load store 12 and the travelling times of the cage from the instantaneous position to the entry or target storey from the travelling time store 14 for the operating costs computation.

Immediately after the computation, the operating costs are transferred into the operating costs register R1 and compared with the operating costs of the other lifts by means of the comparison equipment 10 according to EP-B-0 050 304 assumed by way of example, wherein the lift D is excluded from the comparison as described in the preceding. Let it now be assumed that lift A displays the lowest operating costs so that an allocation instruction is entered (dashed arrows, Figure 2) for storey E10 in the first allocation store RAM2 and for the storey E13 in the second allocation store RAM3. Immediately after the allocation, the selected lift A and its position is indicated in an indicating field of the call-registering and indicating equipment 8 actuated by the passenger, whereupon he moves to the correspondingly identified shaft door 18 and arrives there before the cage arrives.

If the selector R3, in continuation of an assumed upward travel of the

cage situated for example in the region of the storey E4, switches over to the newly allocated storey E10, then the retardation is initiated on reaching the brake onset point according to the drive control EP-B-0 026 406 assumed by way of example.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Group control for lifts with immediate allocation of target calls in dependence on the call entry location on a storey, with call-registering and indicating equipments which are arranged on the storeys and display a keyboard for the entry of calls for desired target storeys, with call stores which are associated with the lifts of the group and connected with the call-registering and indicating equipments, wherein - on the entry of a call on a storey - a call identifying the entry storey and a call identifying the target storey are stored in the call stores with load stores in which the number of the persons present in the respective lift cage is stored for each storey, with travelling time stores, cage position registers and computers associated with the lifts of the group as well as with a comparison equipment, wherein the computer computes operating costs corresponding to the waiting times of passengers from data specific to the lift, and with an operating costs register connected with the computer and the comparison equipment and with allocation stores associated with the call store, wherein the operating costs are compared one with the other and the call concerned is allocated to that lift cage through entry of an allocation instruction into the allocation stores which displays the lowest operating costs, and wherein the lift concerned and its position is indicated on an indicating field of the actuated call-registering and indicating equipment immediately after the call allocation, characterised thereby,

- that a further store, in which the times needed by a passenger for the paths between the respectively actuated call-registering and indicating equipment and the shaft doors of the lifts are stored, is provided for each lift,
- that a comparator is provided, which is connected at the input side with the further store and the travelling time store,
- that the operating costs register is connected by way of a switching equipment to the comparison equipment and
- that the comparator at the output side stands in connection with the switching equipment,



- wherein for the case of a lift cage travelling time, which is stored in the travelling time store and dependent on the cage position and the call input storey, being less than the time needed by a passenger to reach the shaft door of the lift concerned, the switching equipment switches the operating costs register away from the comparison equipment and the lift is excluded from the comparison.
2. Group control according to patent claim 1, characterised thereby, that the switching equipment is formed of three-state buffers, the activating connections of which are connected to the output of the comparator.
3. Group control according to patent claim 1, wherein the call store, the allocation stores, the load store, the travelling time store, the cage position register, the operating costs register and the computer are components of microcomputer systems associated with the lifts, characterised thereby, that the further store and the comparator are further components of the microcomputer systems, wherein the further store is a co-efficient store which displays storage places corresponding to the number of the call-registering and indicating equipments of a storey.
4. Group control according to patent claim 3, wherein the call -registering and indicating equipments display storage cells for the storage of the calls entered on the storeys, characterised thereby,
- that a multiplexer which displays inputs corresponding to the number of the call-registering and indicating equipments on a storey, wherein those inputs of all multiplexers are connected together, which are respectively associated with the same call-registering and indicating equipment, is provided for each lift and each storey,



- that the multiplexers are associated with the call-registering and indicating equipments and outputs of the storage cells of each call-registering and indicating equipment are connected with inputs of an AND-gate,
- that the output of the AND-gate stands in connection with the concerned input of the multiplexer and
- that the multiplexer is connected to the address bus of the associated micro-computer system and the output of the multiplexer stands in connection with the further store by way of a conductor.

DATED this 16th day of November, 1992.

INVENTIO AG

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LJD/MEJ/ML DOC 025 AU7020591.WPC

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Fig. 2

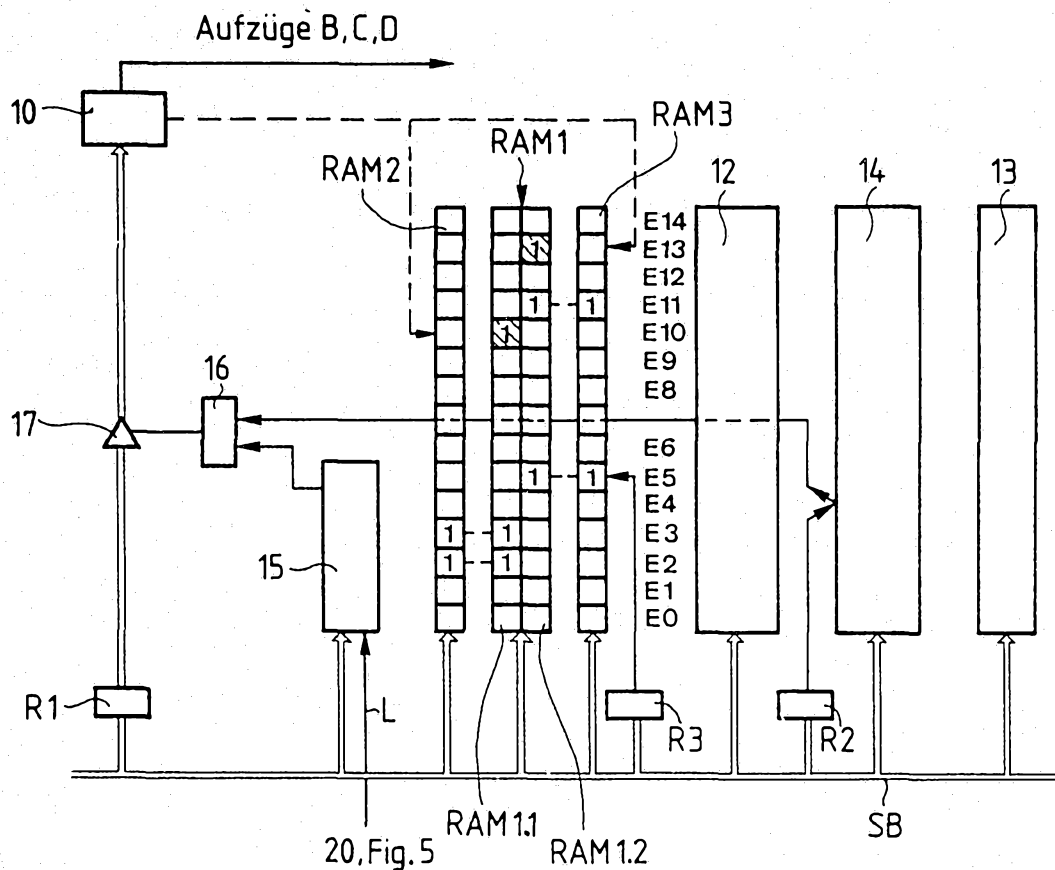


Fig. 5

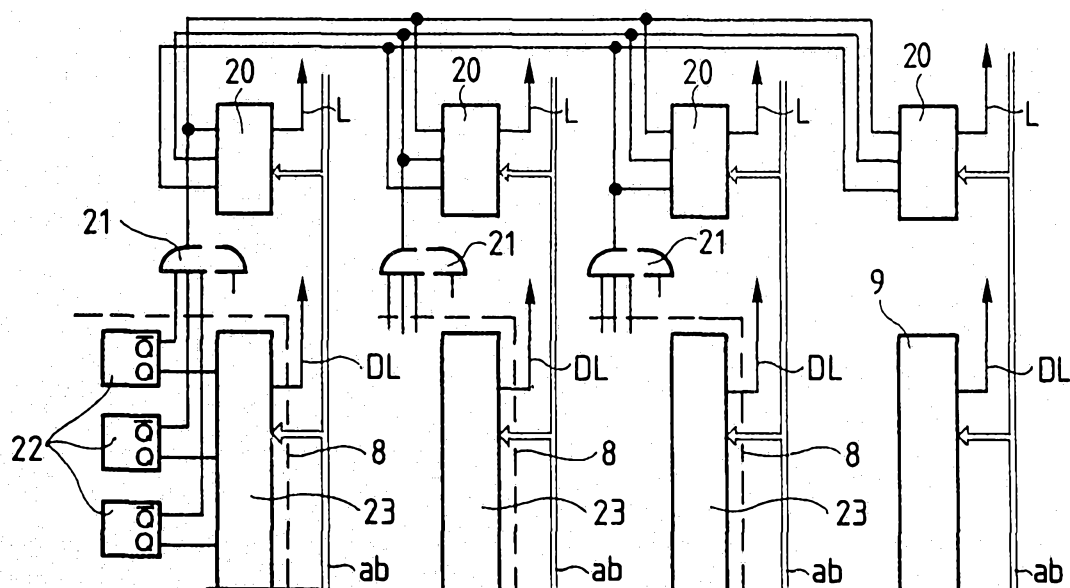


Fig. 3

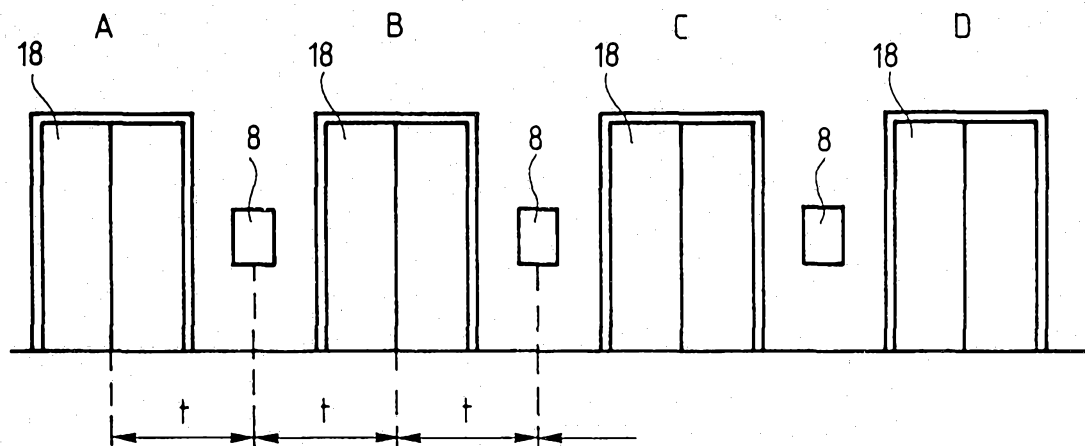


Fig. 4

