

April 24, 1956

D. SANTINI ET AL

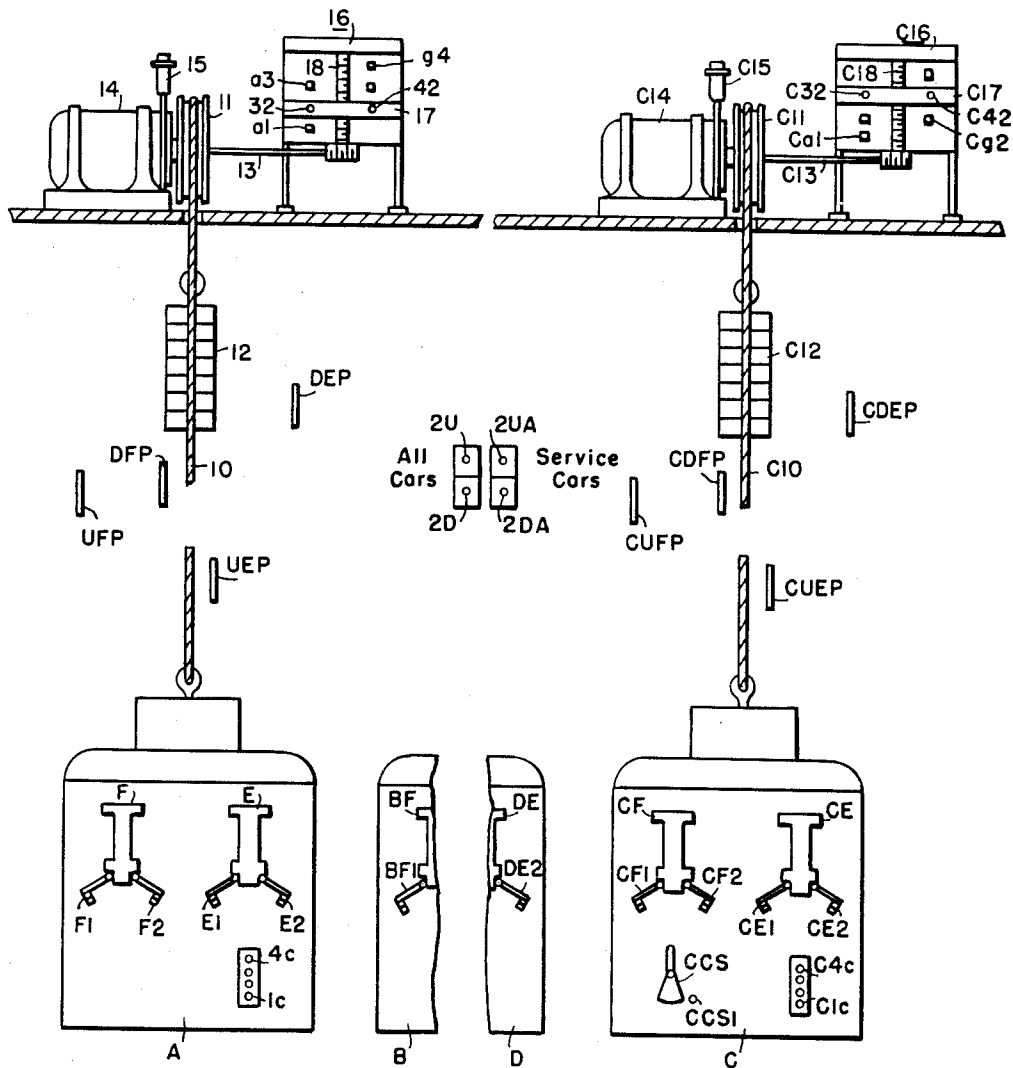
2,742,979

ELEVATOR SYSTEMS HAVING A PLURALITY OF ELEVATOR CARS

Filed Oct. 30, 1953

5 Sheets-Sheet 1

Fig. 1.



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2,742,979

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5 Sheets-Sheet 2

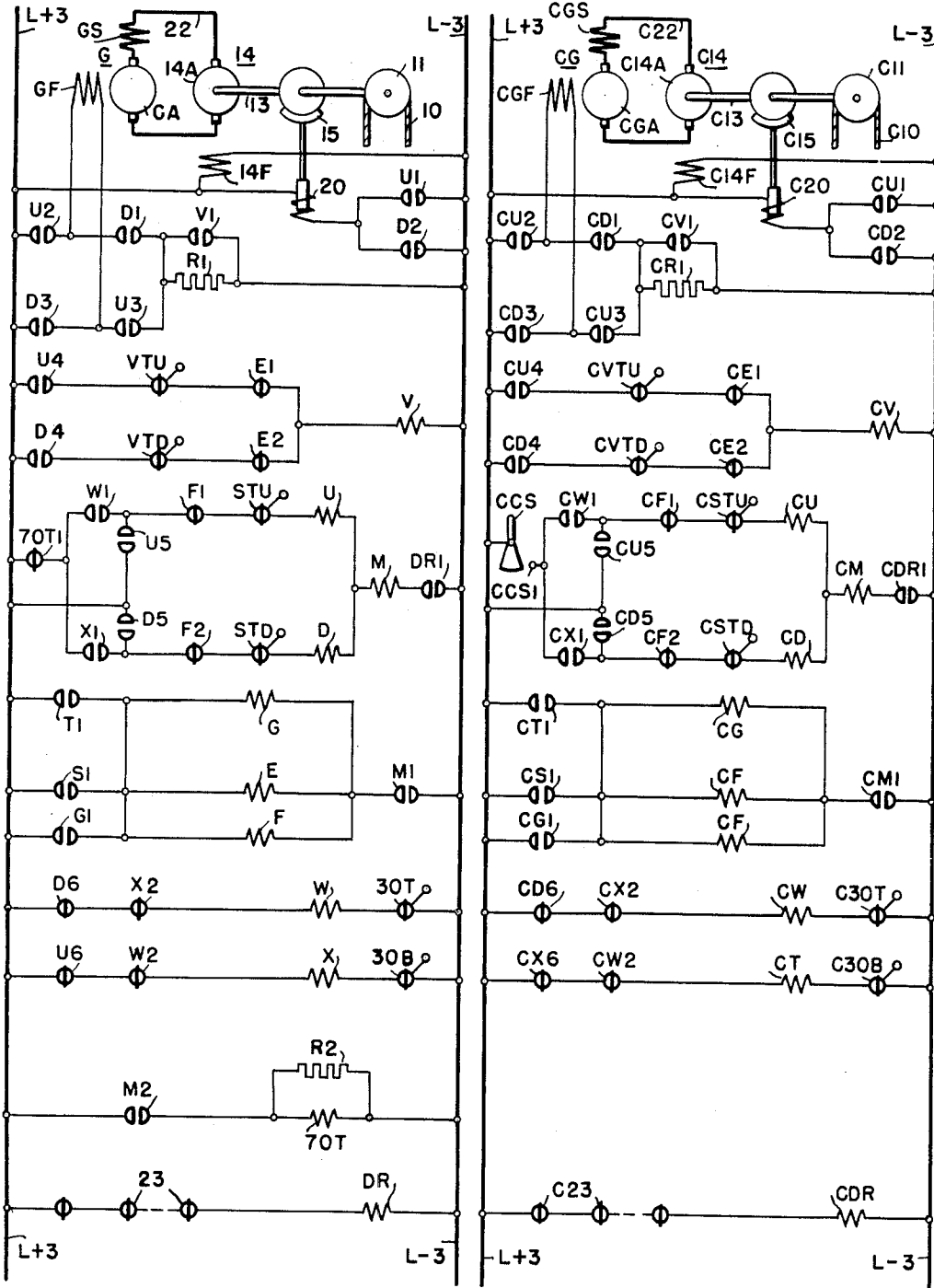


Fig. 2.

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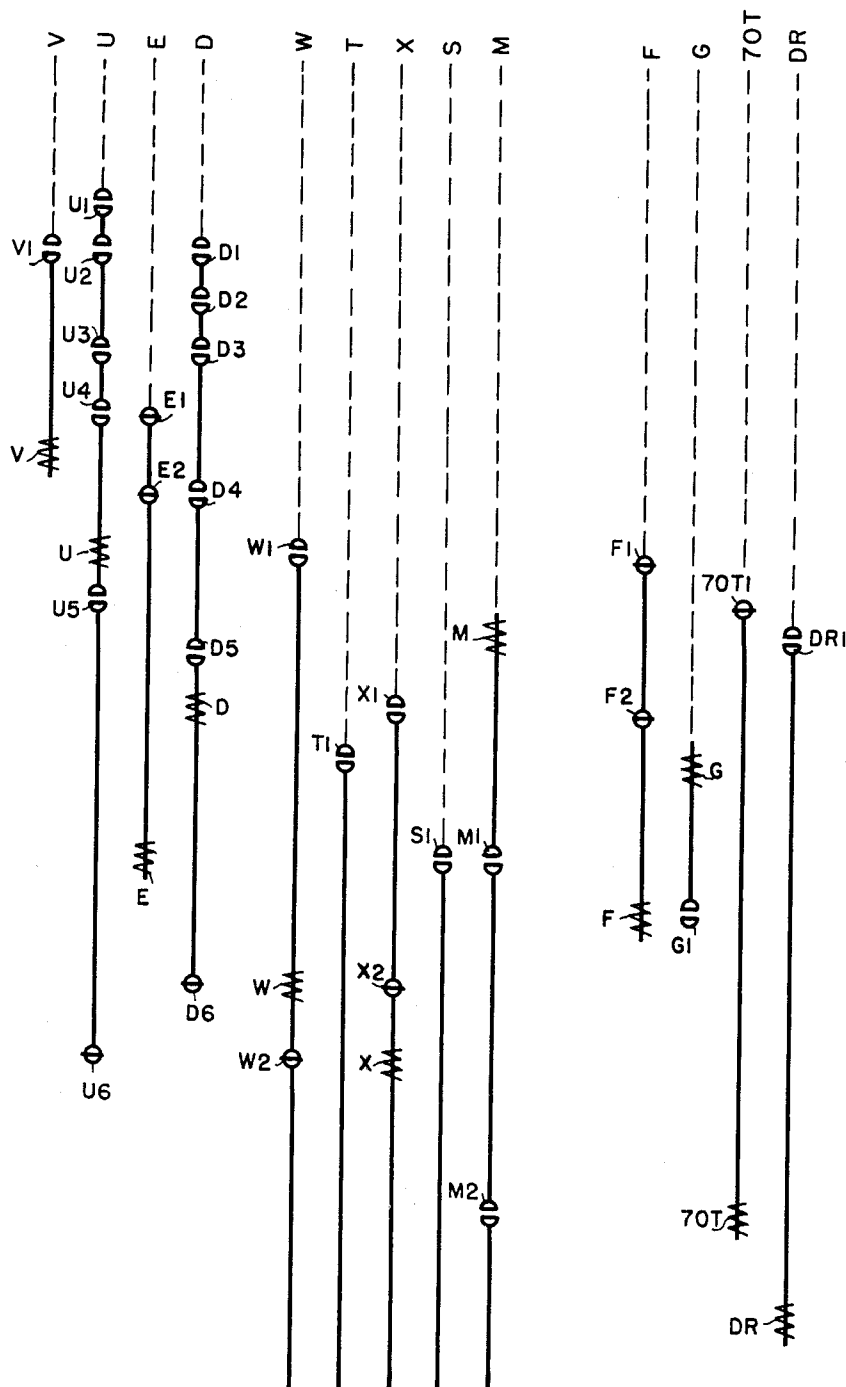


Fig. 2A.

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2,742,979

ELEVATOR SYSTEMS HAVING A PLURALITY OF ELEVATOR CARS

Filed Oct. 30, 1953

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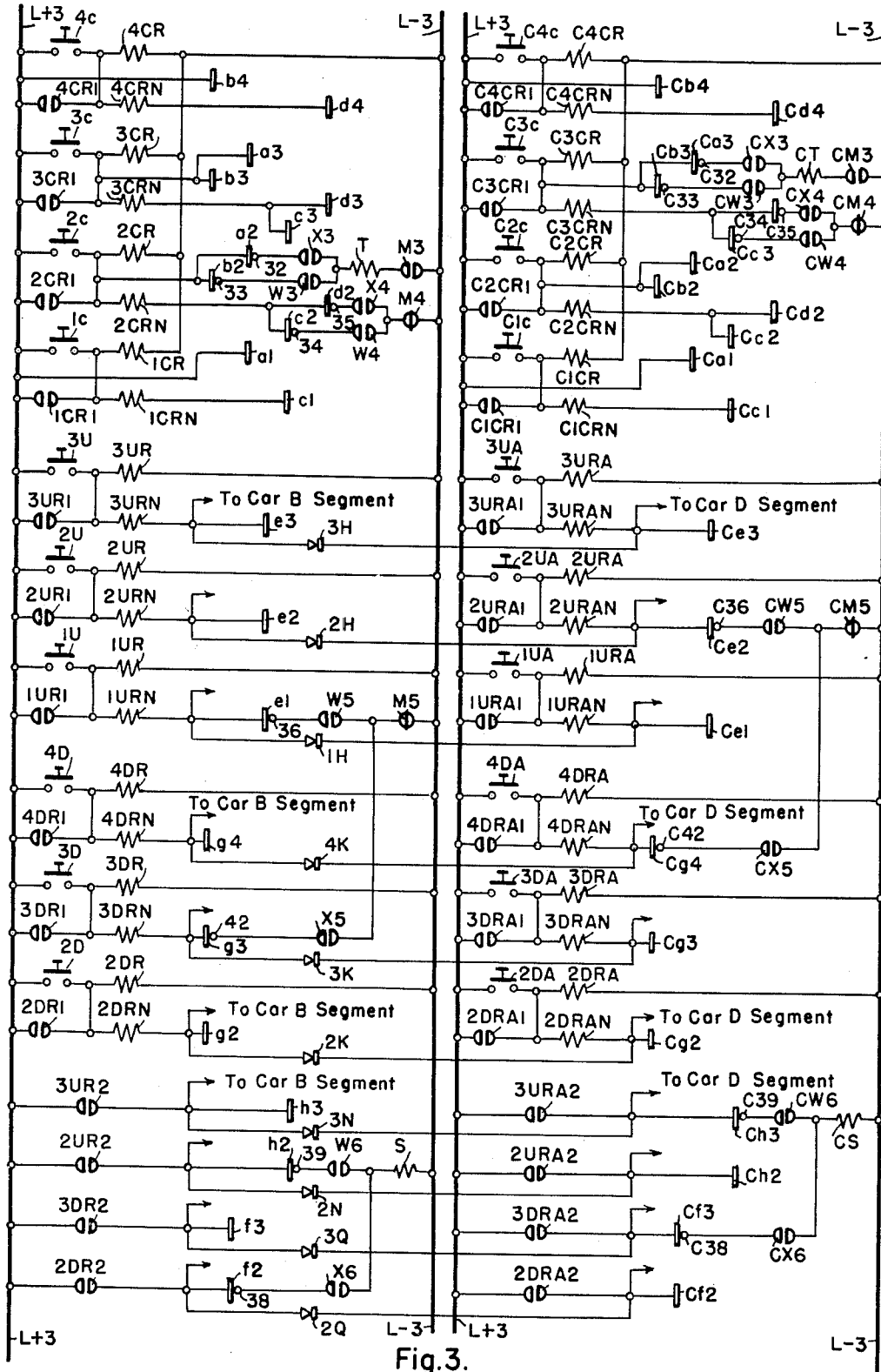


Fig. 3.

April 24, 1956

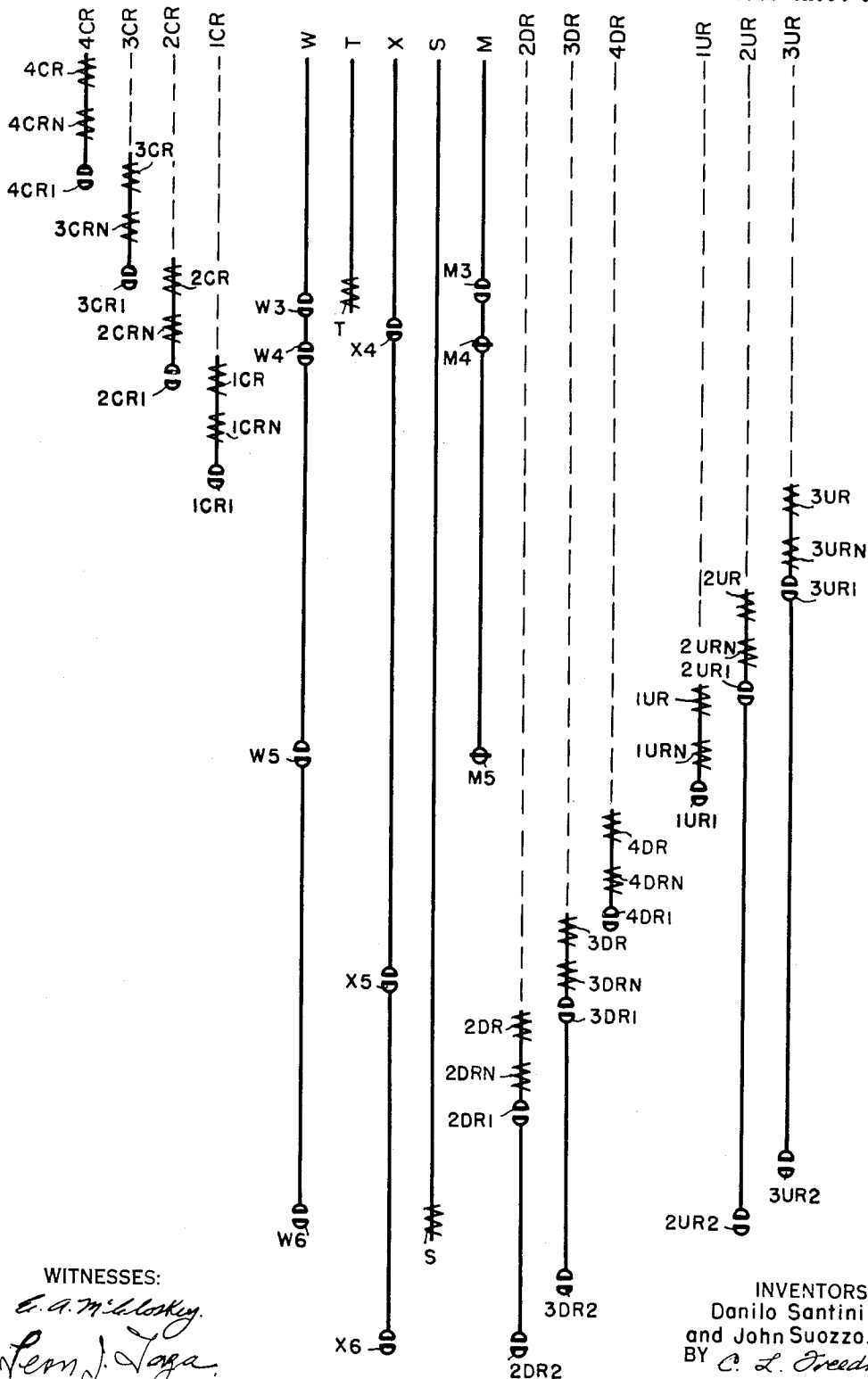
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ELEVATOR SYSTEMS HAVING A PLURALITY OF ELEVATOR CARS

Filed Oct. 30, 1953

5 Sheets-Sheet 5



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Fig. 3A.

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2,742,979

ELEVATOR SYSTEMS HAVING A PLURALITY OF ELEVATOR CARS

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Application October 30, 1953, Serial No. 389,308

13 Claims. (Cl. 187—29)

This invention relates to elevator systems and it has particular relation to elevator systems having a plurality of elevator cars arranged in a bank wherein the elevator cars perform different functions.

In accordance with the invention, a plurality of elevator cars arranged in a bank provide different functions. To this end, the elevator cars in the bank may be divided into two groups. One of the groups contains one or more elevator cars which will be designated as primary elevator cars. The second group may contain one or more elevator cars designated as secondary elevator cars.

The primary and secondary elevator cars may be designed to perform completely different functions or to perform functions which overlap. For example, the secondary elevator cars may be arranged to serve additional floors or they may be provided with facilities for receiving special loads. For present purposes, it will be assumed that the secondary or service elevator cars are arranged to be operated or supervised by elevator car attendants, whereas the primary elevator cars are arranged for operation without elevator car attendants.

Calls for elevator service are divided into two groups. These groups may exercise different controls on the primary and secondary elevator cars. In a preferred embodiment, elevator calls in a first group may be answered by any of the elevator cars in the bank. Calls for elevator service which are in the second group may be answered only by a secondary or service elevator car.

The stopping of any of the elevator cars at a floor for which a call for service is registered falling in the first group while the elevator car is set for the proper direction for serving such call operates to reset or cancel the call. A call for elevator service which falls in the second group can be reset or cancelled only by the stopping of a secondary or service elevator car at the floor for which a call is registered while such elevator car is set for travel in the proper direction for answering the call.

It is, therefore, an object of the invention to provide an improved elevator system wherein a plurality of elevator cars are divided into groups for serving common floors of a structure.

It is a further object of the invention to provide an elevator system wherein calls for elevator service from common floors of a structure are divided into a plurality of groups.

It is also an object of the invention to provide an elevator system wherein calls for elevator service from common floors are divided into a plurality of groups and wherein a plurality of elevator cars are so designed that certain of the elevator cars are required to answer calls for elevator service falling in one of the groups, whereas all of the elevator cars are capable of answering calls falling in another of the groups.

It is an additional object of the invention to provide an elevator system wherein calls for elevator service from common floors of a structure are divided into a plurality of groups and wherein a plurality of elevator cars are divided into groups, an elevator car in a first one of the groups in stopping at a floor being effective for resetting

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all calls for service registered at the floor for the direction of travel of the elevator car, whereas the stopping of an elevator car assigned to another of the groups is effective for cancelling only certain of the calls for elevator service which may be registered for the direction of the elevator car at the floor at which the elevator car stops.

Other objects of our invention will become evident from the following detailed description taken in conjunction with the accompanying drawings, of which:

Figure 1 is a diagrammatic representation of an elevator system embodying my invention.

Figs. 2 and 3 collectively constitute a diagrammatic representation in straight-line form of circuit connection for the elevator system illustrated in Fig. 1. The figures should be assembled vertically in numerical order with Fig. 2 at the top.

Figs. 2A and 3A are key representations of representative relays in Figs. 2 and 3 illustrating coils and contact members disposed in horizontal alignment with their positions in the straight-line circuits of Figs. 2 and 3. Figs. 2A and 3A should be placed beside the corresponding Figs. 2 and 3 to facilitate the location of the various coils and contacts.

Each relay coil or winding is identified by a relay reference character. Each set of relay contacts is identified by the proper relay reference character followed by a number representing the set of contacts.

The elevator system illustrated is provided with four cars A, B, C and D for serving four floors. This number of cars and this number of floors have been selected for the purpose of simplifying the disclosure as much as possible, but it is to be understood that the invention may be used for any reasonable number of cars in a bank serving any reasonable number of floors.

For the sake of simplicity, the similar apparatus individual to each car is given the same reference character except that the apparatus for cars B, C or D is given the prefix B, C or D to indicate that it is for cars B, C or D instead of for car A.

In the discussion which follows, cars A and B are assumed to be connected for operation without car attendants, and cars C and D are assumed to be connected for operation with car attendants. The drawings show primarily cars A and C together with their associated circuits. In Figs. 2 and 3 circuits for the elevator car A are shown primarily in the left hand column and circuits for the elevator car C are shown primarily in the right hand column. It will be understood that the circuits for cars B and D are substantially similar respectively to the circuits for the cars A and C.

Apparatus individual to car A

- D—Down switch
- E—Slow-down inductor relay
- F—Stopping inductor relay
- G—Inductor holding relay
- M—Car running relay
- P—Inductor plates
- R—Resistors
- S—Floor call stopping relay
- T—Car call stopping relay
- U—Up switch
- V—High speed relay
- W—Up direction preference relay
- X—Down direction preference relay
- 70T—Non-interference relay
- DR—Door relay
- ICR
- 2CR
- 3CR
- 4CR

—Car call-storing relays

Apparatus common to all cars

4DR	}	First down call-storing relays
3DR		
2DR		
4DRA		
3DRA	}	Second down call-storing relays
2DRA		
3UR		
2UR		
1UR	}	First up call-storing relays
3URA		
2URA		
1URA		

Apparatus in Fig. 1

Referring more particularly to Fig. 1 of the drawings, it will be observed that a car A is arranged to be supported in a hatchway by a cable 10 which passes over a sheave 11 to a counterweight 12. The sheave 11 is mounted for rotation by a shaft 13 driven by a motor 14. A brake 15 of the usual spring-operated, electromagnetically-released type is provided for stopping further rotation of the sheave 11 when the motor 14 is deenergized.

A floor selector 16 of any suitable type, is provided for connecting the various electrical circuits of the system in accordance with the position of car A. The shaft 13 is extended to operate a brush carriage 17 on the floor selector 16 by mechanically rotating a screw-threaded shaft 18 on which the carriage is mounted. The carriage 17 is provided with a number of brushes which are disposed, upon movement of the car, to successively engage stationary contacts arranged in rows on the selector in positions to correspond to the floors of the building. For simplicity, only two brushes, 32 and 42, and two rows of contact segments *a*1, etc., and *g*2, etc., disposed to be engaged by them are illustrated in Fig. 1, but it will be understood that in the system to be described herein, as well as in practice, a much larger number of brushes and rows of contact segments is required. Other forms of selectors may be substituted for the selector shown, if desired.

A starting switch CCS is mounted in the car C to be operated by the attendant to start the car. When the car switch is rotated anticlockwise, it closes its contacts CCS1 to start the car in the direction for which it is conditioned to operate. When the car switch is centered, it leaves the control system of the car in such condition that the car can be stopped by operation of hall buttons at the floor landings or stop buttons in the car. It is to be understood that the car may be operated by the car switch or that any suitable control means may be substituted for the car switch. The illustration of the car switch is used for simplicity in describing the system. The elevator car A is arranged for operation without a car attendant and does not have a car switch.

Car buttons 1c, etc. (one for each floor) are mounted in the car so that a passenger or attendant may, by operating them, cause the car to stop automatically at any floor. The direction of operation of the car is controlled by relays W and X as will be described in connection with Fig. 2.

In order that waiting passengers may cause the cars to stop at floor landings suitable devices such as first hall buttons are mounted at the floor landings. An up button and a down button are provided at each floor intermediate the terminals. A down button is disposed at the top terminal and an up button at the bottom terminal. Fig. 1 illustrates only the up hall call button 2U and the down hall call button 2D for the second floor.

Second devices, such as second hall buttons are provided for registering calls for the service cars C and D. A second up hall button 2UA is shown for the second floor. A similar button is provided for each floor from which up service is desired. A second down button 2DA

is shown for the second floor. A similar down button is provided for each floor from which down service is desired.

In order to automatically effect accurate stopping of car A at the floors in response to operation of the stopping buttons 2c, etc., in the car, or by operation of the hall call buttons 2U, 2D, etc., at the floor, a slow-down inductor relay E and a stopping inductor relay F are mounted on the car in position to cooperate with suitable inductor plates of iron or other magnetic material, mounted in the hatchway adjacent to each floor. Only the up plates UEP and UFP and the down plates DEP and DFP for the second floor are illustrated. Similar plates are provided for each floor, except that the top terminal has only up plates and the bottom terminal only down plates.

The inductor relays E and F, when their coils are energized, have normally incomplete magnetic circuits which are successively completed by the inductor plates as the car approaches a floor at which a stop is to be made. These relays are so designed that energization of their operating coils will not produce operation of their contacts until the relay is brought opposite its inductor plate thereby completing the relay magnetic circuit. Upon operation of the relay contacts (such as E1 or E2) they remain in operated condition until the relay operating coil is deenergized, even though the inductor relay moves away from the position opposite the inductor plate which completed its magnetic circuit. The plates should be so spaced in the hatchway as to provide desirable distances for slowdown and stopping of the cars at the floors. Other methods of controlling slowing down and stopping of the car may be used if so desired.

Apparatus in Fig. 2

Referring particularly to Fig. 2 of the drawings, it will be observed that control circuits are shown on the left-hand side which are individual to car A and which are similar to the circuits of car B. At the right-hand side, the circuits shown are individual to car C and are similar to the circuits of car D.

As shown, the motor 14 is provided with an armature 14A which is mechanically connected to the shaft 13 for driving the sheave 11. The brake 15 is provided with a winding 20 which is energized on energization of the motor 14. The motor 14 includes the usual shunt-type main field winding 14F, which is connected for energization across the direct current supply conductors L-3 and L+3. The armature 14A is connected for energization by a loop circuit 22 to a generator G which is provided with an armature GA.

In order to control the direction and magnitude of the voltage generated by the generator armature GA, a separately-excited main field winding GF is provided for the generator G. A field resistor R1 is included in the circuit of the field winding GF to provide speed control for the motor 14. The generator G is provided with suitable means such as a series field winding GS for correcting the speed regulation of motor 14.

The break contacts 70T1 of the non-interference relay for the car A is here shown connected to control the energization of the operating windings of an up reversing switch U and a down reversing switch D. The reversing switches U and D are provided with make contact members U2, U3 and D1, D3 for connecting the generator field winding GF to the conductors L-3 and L+3 in accordance with the direction in which it is desired to operate the car. When either the up or the down reversing switch U or D is energized, the car running relay M is also energized to condition certain circuits for operation. The common portion of the circuits of the reversing switches U and D and the running relay M includes make contacts DR1 of the door relay DR.

The elevator car C differs from the elevator car A in that the manually operated master or car switch CCS lo-

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cated in the elevator car C is employed for the elevator car C circuits in place of the break contacts 70T1 for the elevator car A. Otherwise, the circuits thus far described are similar for the two cars.

A high-speed relay V is provided for short-circuiting the resistor R1 disposed in series circuit relation with the generator field winding GF for applying the maximum voltage to that winding when the car is operating at normal high speed. This relay is controlled by make contacts U4 and D4 of the switches U and D on starting and by contacts E1, E2 of the slowdown inductor relay E when stopping.

An upper and a lower mechanical limit switch VTU and VTD, are provided for interrupting the circuit of the high-speed relay V when the car reaches a proper slowdown point in advance of the upper and lower terminals, respectively, and an upper and a lower stopping limit switch STU and STD, are provided for opening the circuits of the reversing switches U and D at the terminal limits, in accordance with the usual practice.

An up direction preference relay W and a down direction preference relay X are provided for controlling the direction of operation of the car and performing certain functions in connection therewith. The operating windings of these relays are controlled in part by a top limit switch 30T and a bottom limit switch 30B. Each of the limit switches 30T and 30B is arranged to be opened when car A arrives at the corresponding terminal, thereby interrupting the circuit of the direction preference relay W or X corresponding to the direction of operation of the car.

Although the cars may be provided with conventional circuits for reversing the cars at their highest calls, such circuits are not illustrated here.

The energizing coils for the slowdown inductor switch E and the stopping inductor switch F are illustrated in this figure as arranged to be energized on operation of the contacts S1 of a floor call stopping relay S or the contacts T1 of a car call stopping relay T. (The operating coils for relays S and T are illustrated in Fig. 3 and will be described in connection therewith.)

An inductor holding relay G is provided for maintaining the inductor relays in energized condition during a decelerating or stopping operation.

A door relay DR is illustrated as controlled by a plurality of door safety contacts 23. One of the contacts 23 is provided for each elevator door and is closed only when the associated door is closed.

The elevator car A has associated therewith the non-interference relay 70T which has a delay in dropout determined by a resistor R2 connected thereacross. A similar relay is not provided for the car C.

Apparatus in Fig. 3

The upper part of Fig. 3 illustrates the car call stopping relay T and circuits for registering or storing car calls. A similar car call stopping relay and similar registering or storing circuits are employed for each of the elevator cars of the system.

The car call storing relays for the elevator car A are associated with four rows of contact segments which are incorporated in the floor selector 16 of Fig. 1. The row of contact segments a1 to a3 associated respectively with the first to third floors previously has been mentioned. It will be recalled that the contact segments a3, a2, and a1 are engaged successively by the brush 32 as the elevator car A proceeds from the fourth to the first floor. In the reference character applied to each of the contact segments, the numeral designates the floor with which the contact segment is associated.

In a somewhat similar manner, the contact segments b2, b3 and b4 are engaged successively by the brush 33 as the elevator car A proceeds from the first to the fourth floor.

The contact segments c1, c2 and c3 are engaged suc-

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cessively by the brush 34 as the elevator car A proceeds from the first to the third floor. Finally, the contact segments d4, d3 and d2 are engaged successively by the brush 35 as the elevator car A proceeds from the fourth to the second floor.

Car call storing relays 1CR to 4CR are provided respectively for the first to the fourth floors. These relays are energized respectively by operation of the car call push buttons 1c to 4c. Each of the relays has associated therewith a resetting or cancelling coil identified by the reference character employed for the relay followed by the suffix N. For example, the car call storing relay 3CR for the third floor has a resetting or cancelling coil 3CRN wound on the same core. When the coil for the relay and the cancelling coil are both energized, the directions of the magnetomotive forces produced thereby are in opposition and the relay, therefore, is reset.

Let it be assumed that a car call for the third floor is registered by the pushbutton 3c. Such operation connects the car call storing relay 3CR across the buses L+3 and L-3 for energization. As a result of such energization, the make contacts 3CR1 close to establish a holding circuit around the pushbutton 3c. The contact segments a3 and b3 now are connected to the bus L+3 through the make contacts 3CR1.

If the elevator car approaches the third floor under the foregoing circumstances while set for travel in the up direction, the brush 33 engages the contact segment b3 to complete the following circuit:

L+3, 3CR1, b3, 33, W3, T, M3, L-3

The car call stopping relay T now is energized to initiate a stopping of the elevator car A at the third floor by a sequence which will be discussed below. As the elevator car comes to a stop, the brush 33 may pass slightly beyond the contact segment b3.

If the elevator car, while set for down travel approaches the third floor at which the car call was registered, the brush 32 would engage the contact segment a3 to complete the following circuit

L+3, 3CR1, a3, 32, X3, T, M3, L-3

The energization of the car call stopping relay T initiates a stopping of the elevator car at the third floor by a sequence which will be discussed below. As the elevator car A comes to a stop, the brush 32 may pass slightly beyond the contact segment a3.

As the elevator car A comes to a stop at the third floor, the break contacts M4 close to cancel the call for the third floor. If the elevator car A is set for travel in the up direction, the following cancelling circuit is completed

L+3, 3CR1, 3CRN, c3, 34, W4, M4, L-3

Since the cancelling coil 3CRN neutralizes the coil of the call storing relay 3CR, the relay is reset.

If the elevator car A is set for down travel at the time of such call, the following circuit is completed

L+3, 3CR1, 3CRN, d3, 35, X4, M4, L-3

Consequently, upon stopping of the elevator car, the cancelling coil 3CRN is energized to reset the relay 3CR.

Since the elevator car A stops at the upper terminal or fourth floor only during up travel, contact segments in the rows a and c are not required for the fourth floor. Also the contact segment b4 for the fourth floor may be connected directly to the bus L+3 to initiate a stopping operation whenever the car A approaches the fourth floor. Inasmuch as the elevator car stops at the lower terminal or first floor only during down travel thereof, contact segments in the b row and the d row are not required for the first floor. The contact segment a1 may be connected directly to the bus L+3 for initiating a stopping operation whenever the car A approaches the first floor.

The central part of Fig. 3 illustrates circuits for registering corridor or floor calls for the elevator cars. Thus, an up floor call may be registered for the first, second or third floor by operation, respectively, of the up push buttons 1U, 2U or 3U. Operation of the push buttons 1U, 2U or 3U, respectively, connects the up call storing relays 1UR, 2UR and 3UR across the buses L+3 and L-3 for energization.

Each of the up call storing relays 1UR, 2UR and 3UR has associated therewith a cancelling or resetting coil, respectively, 1URN, 2URN and 3URN. The association of the coils will be understood from the discussion of the cancelling coils employed for the car call storing relays.

The cancelling coils for the up call storing relays may be energized by the stopping at any floor for which an up floor call is registered of any of the elevator cars set for travel in the appropriate direction. To this end, the elevator car A has contact segments *e1*, *e2*, and *e3* associated respectively with the cancelling coils 1URN, 2URN and 3URN. The contact segments are mounted on the floor selector 16 of Fig. 1 and are engaged successively by the brush 36 as the elevator car A proceeds from the first to the third floor.

Let it be assumed that the push button 2U is operated to connect the relay 2UR across the buses L+3 and L-3 to register an up call for the second floor. As a result of its energization, the relay closes its make contact 2UR1 to establish a holding circuit around the push button 2U.

As the elevator car A, while set for up travel, stops at the second floor, the break contacts M5 close to complete the following cancelling circuit

L+3, 2UR1, 2URN, *e2*, 36, W5, M5, L-3

Each of the contact segments *e1*, *e2* and *e3* is connected directly to a corresponding contact segment for any other elevator car in the first group. For example, if the elevator car B is employed, the direct connections may be effected through the circuits identified by arrows bearing the legend "To car B segment." Consequently, the stopping of the elevator car B at a floor at which an up floor call is registered would be effective for cancelling such call.

Each of the contact segments *e1*, *e2* and *e3* is connected through a unidirectional blocking device to a corresponding contact segment for the elevator car C. For example, the contact segment *e3* is connected through a rectifier 3H to a contact segment Ce3 for the elevator car C. The rectifier 3H is poled to permit the flow of current to the right as viewed in Fig. 3, but to block the flow of current in the opposite direction. Similar rectifiers 2H and 1H are provided, respectively, for the circuits for the second and first floors.

By inspection of Fig. 3, it will be observed that the stopping of the elevator car C, while set up for travel at a floor for which an up call is registered by one of the relays 1UR to 3UR, is effective for cancelling the call. For example, if the elevator car C stops at the second floor while set for up travel and while a call for up service is registered by the relay 2UR, the following cancelling circuit is completed

L+3, 2UR1, 2URN, 2H, Ce2, C36, CW5, CM5, L-3

Each of the contact segments Ce1, Ce2 and Ce3 is connected directly to a corresponding contact segment for each of the elevator cars in the second group. For example, if the elevator car D is employed, the connections are effected through the circuits identified by the arrows bearing the legend "To car D segment."

Up floor calls also may be registered by operation of the push buttons 1UA, 2UA and 3UA, respectively, for the first, second and third floors. Operation of these push buttons is effective for connecting the second up floor call storing relays 1URA, 2URA and 3URA for energization. These relays have holding contacts 1URA1, 2URA1 and 3URA1 and cancelling coils

1URAN, 2URAN and 3URAN associated therewith. Each of the cancelling coils connects the associated contact segment Ce1, Ce2 or Ce3 to the bus L+3 through the associated holding contacts 1URA1, 2URA1 or 3URA1.

The second up call storing relays can be reset only by the stopping of an elevator car in the second group, such as one of the elevator cars C or D, while set for up travel at the appropriate floor. For example, let it be assumed that an up floor call is registered by operation of the push button 2UA to energize the second up call storing relay 2URA. If the elevator car C, while set for up travel, stops at the second floor, the following cancelling circuit is completed

L+3, 2PRA1, 2URAN, Ce2, C36, CW5, CM5, L-3

The stopping of the elevator car A, while set for up travel at the second floor, would not have reset the relay 2URA. This is for the reason that the rectifier 2H prevents the flow of current from the right hand portion of the bus L+3 through the contacts 2URA1 and the cancelling coil 2URAN to the contact segment *e2* for the elevator car A.

In a somewhat similar manner, first down call storing relays 2DR, 3DR and 4DR are associated with the push buttons 2D, 3D and 4D, respectively, for the second, third and fourth floors, and second down call storing relays 2DRA, 3DRA and 4DRA are associated with push buttons 2DA, 3DA and 4DA for the second, third and fourth floors. The first down call storing relays 2DR, 3DR and 4DR, respectively have associated therewith cancelling coils 2DRN, 3DRN and 4DRN and contact segments *g2*, *g3* and *g4*. It will be understood that each of these contact segments is connected to a corresponding contact segment for each of the other elevator cars in the first group. Thus, for the elevator car B, the connections are through the circuits with the arrows bearing the legend "To car B segment."

The second down call storing relays 2DRA, 3DRA and 4DRA, respectively, are associated with cancelling coils 2DRAN, 3DRAN and 4DRAN and with contact segments Cg2, Cg3, and Cg4.

Unilateral blocking devices such as the rectifiers 2K, 3K and 4K are employed for connecting the corresponding contact segments in the *g* and Cg rows. For example, the contact segment *g3* is connected to the contact segment Cg3 through the rectifier 3K. The design and purpose of the rectifiers will be understood from the preceding discussion of the rectifiers 1H through 3H.

The lower part of Fig. 3 illustrates circuits for initiating the stopping operation of the elevator cars at floors for which floor calls are registered. It will be recalled that the contact segments *a1* and *b4* always initiate a stopping of the elevator car A at the first and fourth floors, respectively. For this reason, circuits are illustrated in the lower part of Fig. 3 only for the intermediate floors, in this case, the second and third floors.

The elevator car A has contact segments *h2* and *h3* which are connected to the bus L+3, respectively, through the make contacts 2UR2 and 3UR2 of the first up call storing relays for the second and third floors. These contact segments are located on the floor selector 16 of Fig. 1 and are engaged successively by the brush 39 as the elevator car A, during up travel, nears the second and third floors. Each of the contact segments is connected directly to a corresponding contact segment for each additional elevator car in the first group. If the elevator car B is employed, the connections for the segments are identified by the arrows bearing the legend "To car B segment." In a somewhat similar manner, the contact segments Ch2 and Ch3 for the elevator car C are connected to the bus L+3 through the make contacts 2URA2 and 3URA2 of the second up call storing relays for the second and third floors. Each of these contact segments is connected directly to a corresponding contact

segment for each additional elevator car in the second group. Thus, if the elevator car D is employed, the connections are represented by arrows bearing the legend "To car D segment."

The elevator car A also has associated therewith contact segments *f2* and *f3* for the intermediate floors which are connected to the bus L+3 through make contacts 2DR2 and 3DR2 of the first down floor call storing relays for the first and second floors. The contact segments *f3* and *f2* are engaged successively by a brush 38 as the elevator car A, during down travel, nears the third and second floors. Each of the contact segments is connected directly to a corresponding contact segment for each of the additional elevator cars in the first group. The arrows in Fig. 3 adjacent the contact segments *f2* and *f3* indicate the connections for the elevator car B segments.

In a similar manner, the contact segments *Cf2* and *Cf3* are connected to the bus L+3 through the make contacts 2DRA2 and 3DRA2 of the second down call storing relays for the second and third floors.

Unilateral blocking devices, such as rectifiers 3N, 2N, 3Q and 2Q, again are employed to connect the contact segments in the *h* and *f* rows, respectively to those in the *Ch* and *Cf* rows in the manner discussed above. For example, the rectifier 3Q connects the contact segments *f3* and *Cf3*. The remaining connections may be traced by inspection of Fig. 3.

Operation

In order to make certain that the elevator system is fully understood, typical operations of the elevator system now will be considered. It will be assumed initially that the elevator cars are both at the lower terminal floor. Both of the elevator cars are set for up travel. For the elevator car A, this means that the up direction preference relay W (Fig. 2) is energized and picked up, whereas the down direction preference relay X is deenergized and dropped out. It will be assumed further that the make contacts M2 opened immediately prior to the time under consideration and that the non-interference relay 70T is timing out.

At this point, it will be assumed that an up call is registered for the second floor by operation of the push button 2U, that down calls for the second floor are registered by operation of the push buttons 2D and 2DA, and that a down call for the third floor is registered by operation of the push button 3DA.

By reference to Fig. 3, it will be noted that the operation of the push button 2U energizes the first up call storing relay 2UR. This relay closes its make contacts to establish a self-holding circuit and closes its make contacts 2UR2. In an analogous manner, operation of the push buttons 2D, 2DA and 3DA results in closure of the self-holding contacts 2DR1, 2DRA1 and 3DRA1. In addition, make contacts 2DR2, 2DRA2 and 3DRA2 also close.

Referring to Fig. 2, it now will be assumed that unloading and loading of the elevator car A has been completed, that the non-interference relay 70T times out and closes its break contacts and that the doors for the elevator car have all been closed. The operation of elevator doors is well known in the art. The following circuit is now established

L+3, 70T1, W1, F1, STU, U, M, DR1, L-3

It will be understood that the closure of all the doors resulted in energization of the door relay DR and closure of the make contacts DR1.

The up switch U now is energized and closes its make contacts U1 to energize the winding 20 for the purpose of releasing the brake 15. In addition, make contacts U2 and U3 close to energize the generator field winding GF with proper polarity for up travel of the elevator car A. Make contacts U4 close to complete

with the closed limit switch VTU and break contacts E1 an energizing circuit for the speed relay V. This relay closes its make contacts V1 to shunt the resistor R1. The generator G is now energized for full speed up travel of the elevator car and the elevator car now leaves the first floor.

Closure of the make contact U5 completes a holding circuit around the contacts 70T1 and W1. Opening of the break contact U6 has no immediate effect on the operation of the system.

As a result of its energization and pick up, the car running relay M closes its make contact M1 without affecting the immediate operation of the system. Make contacts M2 close to energize the non-interference relay 70T, and this relay opens its break contacts 70T1. However, the holding contacts U5 maintain the energization of the up switch U and the car running relay M. Closing of the make contacts M3 (Fig. 3) and opening of the break contacts M4 and M5 have no immediate effect on the operation of the system.

As the elevator car A nears the second floor, the brush 39 engages the contact segment *h2* to complete the following circuit

L+3, 2U2, *h2*, 39, W6, S, L-3

As a result of its energization, the floor call stopping relay S closes its make contacts S1 (Fig. 2) to complete with the closed make contacts M1 an energizing circuit for the relays G, E, and F. The inductor holding relay closes its make contacts G1 to establish a holding circuit around the contacts S1.

As the elevator car A continues its upward movement, the inductor relay E reaches the inductor plate UEP (Fig. 1) for the second floor and the break contacts E1 open to deenergize the speed relay V (Fig. 2). When the contacts E1 once open, they remain open until the coil for the relay E is deenergized even though the inductor relay passes the associated inductor plate.

As a result of deenergization, the speed relay V opens its make contacts V1 to introduce the resistor R1 in series with the generator field winding GF. The reduction in field strength of the generator G slows the elevator car A to a landing speed. As the elevator car A still further approaches the second floor, the stopping inductor relay F reaches the inductor plate UFP for the second floor and opens its break contacts F1 to deenergize the up switch U (Fig. 2) and the car running relay H.

The up switch U opens its make contacts U1 to deenergize the winding 20 and permit reapplication of the brake 15. In addition, make contacts U2 and U3 open to deenergize the generator field winding GF. The elevator car A now stops accurately at the second floor.

Opening of the make contacts U4 and U5 and closure of make contacts U6 have no immediate effect on the operation of the system.

The car running relay M opens its make contacts M1 to deenergize its relays G, E and F. The inductor holding relay G opens its make contacts without effecting the operation of the system. Opening of the make contacts M2 deenergizes the non-interference relay 70T and this relay starts to time out. The timing out or delay in drop out of the non-interference relay 70T is sufficient to permit opening the doors of the elevator car and loading or unloading the elevator car as required.

Turning to Fig. 3, it will be noted that opening of the make contacts M3 and closing of the break contacts M4 have no effect on the immediate operation of the system. However, closing of the break contacts M5 completes a cancelling circuit. It will be understood that since the elevator car A is at the second floor, the brush 36 is in engagement with the contact segment *e2*. Consequently, the following cancelling circuit is completed

L+3, 2UR1, 2URN, *e2*, 36, W5, M5, L-3

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The energized cancelling coil 2URN resets the first up call storing relay 2UR which opens its holding contacts 2UR1 and its contacts 2UR2.

The opening of the doors of the elevator car to permit entry of the passenger results in deenergization of the door relay DR (Fig. 2) and opening of the make contacts DR1. After loading of the passengers, the non-interference relay 70T times out and closes its break contacts 70T1, and the doors are reclosed to energize the door relay DR and close the contacts DR1. This sequence completes an energizing circuit for the up switch U and the car running relay M. The up switch U and the car running relay M initiate an upward movement of the elevator car A from the second floor by a sequence which will be clear from the preceding discussion of the movement of the elevator car A upward from the first floor.

It is assumed that the passenger who enters the elevator car at the second floor registers a car call for the fourth floor by operation of the push button 4c (Fig. 3) to energize the car call storing relay 4CR. This relay closes its holding contacts 4CR1.

As the elevator car nears the fourth floor, the brush 33 engages the contact segment b4 to complete the following circuit

L+3, b4, 33, W3, T, M3, L-3

The car call stopping relay T closes its make contacts (Fig. 2) to complete with the make contacts M1 an energizing circuit for the relays G, E and F. These cooperate to initiate a stopping operation of the elevator car A at the fourth floor by a sequence which will be understood from the discussion of the stopping of the elevator car at the second floor.

As the elevator car A reaches the fourth floor, the cam operated limit switch 30T (Fig. 2) opens to deenergize the up direction preference relay W. This relay opens its make contacts W1, W3 (Fig. 3), W4, W5 and W6. In addition, the break contacts W2 (Fig. 2) close to complete with the break contact U6 and the limit switch 30B an energizing circuit for the down direction preference relay X. The down direction preference relay now closes its make contacts X1, opens its break contacts X2 and closes its make contacts X3 (Fig. 3), X4, X5 and X6.

The closure of the make contacts X4 completes with the break contacts M4, which are now closed, the following circuit.

L+3, 4CR1, 4CRN, d4, 35, X4, M4, L-3

As a result of its energization, the cancelling coil 4CRN resets the car call storing relay 4CR.

It will be understood that as the elevator car A stops at the fourth floor, the make contacts M2 (Fig. 2) open to start a timing out operation of the non-interference relay 70T. The doors of the elevator car open to deenergize the door relay DR which opens its make contacts DR1.

After a time interval, the non-interference relay 70T drops out to close its break contacts 70T1. In addition, the doors of the elevator car close to reenergize the door relay DR which closes its make contacts DR1. Consequently, the following circuit is now completed

L+3, 70T1, X1, F2, STD, D, M, DR1, L-3

The down switch D closes its make contacts D2 to energize the winding 20 for the purpose of releasing the brake 15. Make contacts D1 and D3 close to energize the generator field winding GF with proper polarity for down travel of the elevator car A. Make contacts D4 to complete with the limit switch VTD and the break contacts E2 an energizing circuit for the speed relay V which closes its make contacts V1 to shunt the resistor R1. The elevator car A now accelerates to full speed in the down direction.

Closure of the make contacts D5 completes a holding

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circuit around the contacts 70T1 and X1. Opening of break contacts D6 has no effect on the operation of the system at this time.

The car running relay M closes its make contacts M1 and M2. The latter contacts M2 reenergize the non-interference relay 70T, and this relay opens its break contacts 70T1. However, these contacts are now shunted through the make contacts D5.

The car running relay also closes its make contacts M3 (Fig. 3) and opens its break contacts M4 and M5 without immediate effect on the operation of the system.

As the elevator car A nears the third floor for which a down floor call is registered by the second down call storing relay 3DRA, the brush 38 engages the contact segment f3 to complete the circuit

L+3, 3DRA2, 3Q, f3, 38, X6, S, L-3

However, the rectifier 3Q is so poled that current cannot flow in this circuit, and the floor call stopping relay S remains deenergized. For this reason, the elevator car A passes the third floor without stopping.

As the elevator car A nears the second floor, the brush 38 engages the contact segment F2 to complete the circuit

L+3, 2DR2, f2, 38, X6, S, L-3

The energized floor call stopping relay S closes its make contacts S1 (Fig. 2) to complete with the make contacts M1 an energizing circuit for the relays G, E and F. The inductor holding relay G closes its make contacts G1 to establish a holding circuit around the contacts S1.

The elevator car A now continues until the slow down inductor relay E (Fig. 1) reaches the inductor plate DEP for the second floor. The break contacts E2 open to deenergize the speed relay V (Fig. 2). This relay opens its break contacts V1 to introduce the resistor R1 in series with the generator field winding GF. The elevator car A now slows to a landing speed.

The continued movement of the elevator car A at landing speed brings the stopping inductor relay adjacent the inductor plate DFP (Fig. 1) for the second floor and the relay opens its break contacts F2 to deenergize the down switch D and the car running relay M.

The down switch D opens its make contacts D2 to deenergize the winding 20 and reapply the brake 15. Contacts D1 and D3 open to deenergize the generator field winding GF. Opening of the make contacts D4 and D5 and closure of the break contacts D6 have no immediate effect on the operation of the system.

The car running relay M opens its make contacts M1 to deenergize the relays G, E and F, and the inductor holding relay opens its holding contacts G1.

The car running relay also opens its make contacts M2 to start a timing out operation of the non-interference relay 70T. The doors open to deenergize the door relay DR which opens its make contacts DR1. The doors thereafter reclose to reenergize the door relay DR which recloses its make contacts DR1.

Turning to Fig. 3, it will be noted that the car running relay M also opens its make contacts M3 and closes its break contacts M4 and M5. Inasmuch as the brush 42 is now in engagement with the contact segment g2, the following circuit is established

L+3, 2DR1, 2DRN, g2, 42, X5, M5, L-3

The energized cancelling coil 2DRN resets the first down call storing relay 2DR which opens its holding contacts 2DR1 and its make contacts 2DR2, thus cancelling the call at the second floor.

It will be noted that the closure of the break contacts M5 also establishes the following circuit

L+3, 2DRA1, 2DRAN, 2K, g2, 42, X5, M5, L-3

However, the rectifier 2K is poled to prevent the flow of current in this circuit. For this reason, the stopping of

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the elevator car A at the second floor fails to reset the second down call storing relay 2DRA for the second floor.

Upon the expiration of its timing period, the non-interference relay 70T (Fig. 2) drops out and closes its break contacts 70T1. The resultant energization of the down switch D and the car running relay M initiates movement of the elevator car in a down direction by a sequence which will be understood from the previously described starting of the elevator car A from the fourth floor.

It is assumed that the passenger boarding the elevator car A at the second floor registers a car call for the first floor by operation of the push button 1c (Fig. 3) to energize the car call storing relay 1CR. This relay closes its self-holding contacts 1CR1.

As the elevator car A nears the first floor, the brush 32 engages the contact segment a1 to complete the circuit

L+3, a1, 32, X3, T, M3, L-3

The energized car call stopping relay closes its contacts T1 (Fig. 2) to complete with the make contacts M1 an energizing circuit for the relays G, E and F. These cooperate to initiate a stopping operation of the elevator car at the first floor by a sequence which will be understood from the previous description of the stopping of the elevator car at the second floor.

As the elevator car A stops at the first floor, the cam operated limit switch 30B opens to deenergize the down direction preference relay X. This relay opens its make contacts X1 and closes its break contacts X2. Since the contacts D6 and the limit switch 30T are now closed, the up direction preference relay W is energized to set the elevator car for up travel.

Turning to Fig. 3, it will be noted that the up direction preference relay closes its make contacts W4 to complete with the now closed break contacts M4 the following cancelling circuit

L+3, 1CR1, 1CRN, c1, 34, W4, M4, L-3

The energized cancelling coil 1CRN resets the car call storing relay 1CR which opens its holding contacts 1CR1. From the foregoing discussion it is clear that the elevator car A, during its operation, answers calls registered by the first call storing relays and calls registered by its car call storing relays, but the elevator car A does not answer calls registered by the second call storing relays.

Next, it is assumed that the elevator car C starts from the first floor. Such starting is effected by the elevator car attendant in the car who closes the car switch CCS (Fig. 2) and closes his doors to energize the door relay CDR which closes its make contacts CDR1. Such operations complete the following circuit

L+3, CCS, CCS1, CW1, CF1, CSTU, CU, CM, CDR1, L-3

The energized up switch CU and the car running relay CM initiate the movement of the elevator car C in the up direction by a sequence which will be clear from the previously described starting of the elevator car A from the first floor as a result of the energization of the up switch U and the car running relay M.

At this stage, calls remain registered by the second call storing relays 3DRA and 2DRA for the third and second floors.

The elevator car C proceeds to the fourth floor, stops at the fourth floor, reverses its direction of travel and starts down by a sequence which will be understood from the previously discussed operation of the elevator car A. The essential difference between the operations of the cars A and C resides in the fact that the car switch CCS for the elevator car C replaces the break contacts 70T1 for the elevator car A to initiate movement of the elevator car.

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As the elevator car C leaves the fourth floor, it will be assumed that an intending passenger at the second floor operates the push button 2D (Fig. 3) to energize the first down call storing relay 2DR for the second floor. This relay closes its holding contacts 2DR1 and make contacts 2DR2.

As the elevator car C nears the third floor, the brush C38 engages the contact segments C/3 to complete the following circuit

L+3, 3DRA2, C/3, C38, CX6, CS, L-3

The floor call stopping relay CS initiates a stopping operation of the elevator car C at the third floor by a sequence which will be understood from the prior discussion of the stopping of the elevator car A at the second floor following energization of the floor call stopping relay S.

As the elevator car C stops at the third floor, the break contact CM5 closes to complete the following cancelling circuit

L+3, 3DRA1, 3DRAN, Cg3, C42, CX5, CM5, L-3

The energized cancelling coil 3DRAN resets the second down call storing relay 3DRA for the third floor. This relay opens its holding contacts 3DRA1 and opens its make contacts 3DRA2.

After the passenger at the third floor has boarded the elevator car C, the elevator car attendant operates his car switch and closes his doors to start the elevator car C from the third floor by a sequence which will be understood from the previous discussion. It is assumed that the passenger desires to proceed to the first floor and that the elevator car attendant operates the push button C1c to energize the car call storing relay C1CR for the first floor. The relay closes its holding contacts C1CR1.

As the elevator car C nears the second floor, the brush C38 engages a contact segment C/2 to complete the following circuit

L+3, 2DRA2, C/2, C38, CX6, CS, L-3

At the same time, the following circuit is also completed

L+3, 2DR2, 2Q, C/2, C38, CX6, CS, L-3

Consequently, either the call registered by the first down call storing relay 2DR or the call registered by the second down call storing relay 2DRA for the second floor is effective for energizing the floor call stopping relay CS. The floor call stopping relay initiates a stopping operation of the elevator car C at the third floor by a sequence which will be understood from the preceding discussion.

As the elevator car C stops at the second floor, the following two cancelling circuits are established

L+3, 2DRA1, 2DRAN, Cg2, C42, CX5, CM5, L-3

L+3, 2DR1, 2DRN, 2K, CG2, C42, CX5, CM5, L-3

Consequently, in stopping at the second floor, the elevator car C resets both of the down call storing relays 2DR and 2DRA.

After the intending passenger at the second floor has boarded the elevator car C, the elevator car may proceed to the first floor by a sequence which will be understood from the foregoing discussion.

From the foregoing discussion, it is clear that a call registered by any of the first call storing relays is effective for stopping the first available elevator car for the purpose of answering the call. By the explanation "first available elevator car" reference is made to the first car to approach the floor at which the call is registered, which is capable of stopping at the floor, and which on leaving the floor will be set for travel in the proper direction to answer the registered call.

Any elevator car which stops at a floor at which a call

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is registered by one of the first call storing relays and which is set for travel in a direction suitable for answering the registered call, cancels such registered call.

With respect to calls registered by the second call storing relays, such a call is effective only for stopping one of the elevator cars in the second group, in this case, one of the elevator cars C or D. Furthermore, such a call can be cancelled only by the stopping of one of the elevator cars in the second group at the floor of the registered call while set for travel in a direction suitable for answering the registered call.

Although the invention has been described with reference to certain specific embodiments thereof, numerous modifications falling within the spirit and scope of the invention are possible.

We claim as our invention:

1. In an elevator system, a structure having a plurality of floors, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure, first and second operating devices operable from certain of said floors, first control means cooperating with the motive means in response to operation of the first operating device for stopping only a predetermined one of said elevator cars at one of the floors, and auxiliary control means cooperating with the first control means and the motive means in response to operation of the second operating device for stopping the first available one of said elevator cars at one of the floors, said second operating device being effective when operated in cooperation with the first control means and the motive means for stopping the predetermined one of the elevator cars at one of the floors when the last-named elevator car is the first available elevator car to reach the last-named floor.

2. In an elevator system, a structure having a plurality of floors, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure, first and second operating devices operable from certain of said floors, first control means cooperating with the motive means in response to operation of the first operating device for stopping only a predetermined one of said elevator cars at one of the floors which the elevator car is approaching in a first direction, and auxiliary control means cooperating with the first control means and the motive means in response to operation of the second operating device for stopping the first available one of said elevator cars at one of the floors which the available one of said elevator cars is approaching in said first direction, said second operating device being effective when operated in cooperation with the first control means and the motive means for stopping the predetermined one of the elevator cars at one of the floors when the last-named elevator car is the first available elevator car to reach the last-named floor.

3. In an elevator system, a structure having a plurality of floors, first and second elevator cars, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure, first and second operating devices, first control means cooperating with the motive means in response to operation of the first operating device for stopping only said first elevator car at one of the floors which the elevator car is approaching in a first direction, and auxiliary control means cooperating with the first control means and the motive means in response to operation of the second operating device for stopping the first available one of said elevator cars at one of the floors which the available one of said elevator cars is approaching in said first direction, means responsive to the stopping of the first elevator car at a floor while set for travel in said first direction for resetting any operated one of said first and second operating devices for the floor at which

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the first elevator car stops, and means responsive to the stopping of the second elevator car while set for travel in the first direction at a floor for which both of the operating devices are operated for resetting only the second operating device for the last-named floor.

4. In an elevator system, a structure having a plurality of floors, a first elevator car, a second elevator car, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure for serving the floors, first call registering means operable for registering a first call for elevator service in a first direction for a first one of said floors, second call registering means operable from the first one of said floors for registering a second call for elevator service in said first direction for said first one of said floors, and control means cooperating with the motive means and the call registering means for moving each of the elevator cars and for stopping the first available one of the elevator cars at said first one of said floors in response to a call registered by the first call registering means, said control means cooperating with the motive means and the call registering means for stopping the first elevator car when available in response to a call registered by the second call registering means, said second call registering means being ineffective for initiating a stopping operation of the second elevator car.

5. An elevator system as claimed in claim 4 in combination with resetting means responsive to the stopping of the either of said elevator cars at said first one of the floors while set for travel in the first direction and while a call for service is registered by the first call registering means for resetting the first call registering means, said resetting means being responsive to the stopping of the first elevator car at said first one of the floors while set for travel in the first direction and while a call for service is registered by the second call registering means for resetting the second call registering means, the stopping of the second elevator car at said floor being ineffective for resetting the second call registering means.

6. In an elevator system, a structure having a plurality of floors, a first elevator car, a second elevator car, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure for serving the floors, first call registering means operable for registering a first call for elevator service in a first direction for a first one of said floors, second call registering means operable for registering a second call for elevator service in said first direction for said first one of said floors, and control means cooperating with the motive means and the call registering means for moving each of the elevator cars and for stopping the first available one of the elevator cars at said first one of said floors in response to a call registered by the first call registering means, said control means cooperating with the motive means and the call registering means for stopping the first elevator car when available in response to a call registered by the second call registering means, said second call registering means being ineffective for initiating a stopping operation of the second elevator car, third call registering means operable from within each of the elevator cars for registering a call for said first one of the floors, said third call registering means cooperating with the control means and the motive means to move each of the elevator cars and to stop each of the elevator cars at the first one of the floors in response to a call registered by the third call registering means for each of the elevator cars to be stopped, resetting means responsive to the stopping of the either of said elevator cars at said first one of the floors while set for travel in the first direction and while a call for service is registered by the first call registering means for resetting the first call registering means, said resetting means being responsive to the stopping of the first elevator car at said first one of the floors while set for travel in the first direction and

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while a call for service is registered by the second call registering means for resetting the second call registering means, the stopping of the second elevator car at said floor being ineffective for resetting the second call registering means.

7. In an elevator system, a structure having a plurality of floors, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure for serving the floors, first call registering means for each of a plurality of the floors, each of said first call registering means being operable from its associated floor for registering a call for elevator service in a predetermined first direction from such floor, second call registering means for each of a plurality of the floors, each of said second call registering means being operable from its associated floor for registering a call for elevator service in said first direction from such floor, third call registering means for each of a plurality of said floors, each of said third call registering means being operable from its associated floor for registering a call for elevator service in a second direction from such floor, fourth call registering means for each of a plurality of said floors, each of the fourth call registering means being operable from its associated floor for registering a call for elevator service in the second direction from said floor, control means cooperating with the motive means in response to operation of each of said first and third call registering means for stopping the first available one of said elevator cars at any floor for which a call is registered by any of the first and third call registering means, and means cooperating with the motive means and the control means in response to operation of each of said second and fourth call registering means for stopping only certain of said elevator cars when available at any floor for which a call is registered by any of the second and fourth call registering means.

8. In an elevator system, a structure having a plurality of floors, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure for serving the floors, first call registering means for each of a plurality of the floors, each of said first call registering means being operable from its associated floor for registering a call for elevator service in a predetermined first direction from such floor, second call registering means for each of a plurality of the floors, each of said second call registering means being operable from its associated floor for registering a call for elevator service in said first direction from such floor, third call registering means for each of a plurality of said floors, each of said third call registering means being operable from its associated floor for registering a call for elevator service in a second direction from such floor, fourth call registering means for each of a plurality of said floors, each of the fourth call registering means being operable from its associated floor for registering a call for elevator service in the second direction from said floor, control means cooperating with the motive means in response to operation of each of said first and third call registering means for stopping the first available one of said elevator cars at any floor for which a call is registered by any of the first and third call registering means, and means cooperating with the motive means and the control means in response to operation of each of said second and fourth call registering means for stopping only certain of said elevator cars when available at any floor for which a call is registered by any of the second and fourth call registering means, means responsive to the stopping of said certain of said elevator cars at any floor for resetting all of said call registering means by which calls are registered for the last-named floor which can be served by movement of the stopped car in the direction for which it is set, and

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means responsive to the stopping at a floor for which calls are registered by all of the call registering means of one of said elevator cars other than said certain of elevator cars for resetting only one of the first and third call registering means.

9. In an elevator system, a structure having a plurality of floors, a first elevator car, a second elevator car, means mounting each of the elevator cars for movement relative to the structure, motive means for moving each of the elevator cars relative to the structure for serving the floors, first call registering means operable for registering a first call for elevator service in a first direction for a first one of said floors, second call registering means operable from said first one of said floors for registering a second call for elevator service in said first direction for said first one of said floors, manually-operable means operable in said first elevator car, first control means cooperating with the motive means, in response to operation of the manually-operable means for moving the first elevator car from a floor at which the elevator car is stopped, second control means responsive to expiration of a time period after the second elevator car has stopped at one of the floors for cooperating with the motive means for moving the second elevator car from the last-named floor; first stop-initiating means responsive to a call registered for a floor by the first call registering means for initiating a stopping operation of the first available one of said elevator cars at the last-named floor, and stop-initiating means responsive to a call registered for a floor by the second call registering means for initiating a stopping operation of the first elevator car at the last-named floor, said second stop-initiating means being ineffective for initiating a stopping operation of the second elevator car.

10. An elevator system as claimed in claim 9 in combination with first resetting means responsive to the stopping of the first elevator car at a floor while set for travel in said first direction for resetting any of said call-registering means for said last-named floor which is operated, and second resetting means responsive to the stopping of the second elevator car at a floor while set for travel in said first direction for resetting the first call-registering means for said last-named floor, said last named stopping being ineffective for resetting the second call-registering means.

11. In an elevator system, a structure having a plurality of floors, a plurality of elevator cars, means mounting the elevator cars for movement relative to the structure, a plurality of partial circuits for each of said cars each of the circuits representing a position of the associated car, means responsive to the position of a first one of said cars for effectively completing the circuits corresponding to said position for all of the cars, and means responsive to the position of a second one of the cars for effectively completing one of the circuits corresponding to such position for part only of said elevator cars.

12. In an elevator system, a structure having a plurality of floors, a plurality of cars, means mounting the elevator cars for movement relative to the structure, a direct-current source, a plurality of partial circuits for each of said elevator cars, means associated with each of the elevator cars for successively completing effectively each of the partial circuits for the associated elevator car for energization from said source, and separate rectifier means connecting each of the partial circuits for one of the elevator cars to the corresponding partial circuits for each of the remainder of the elevator cars to permit effective completion of all corresponding ones of said partial circuits in response to completion of one of the partial circuits for a first one of the elevator cars, and to permit effective completion of only one of said partial circuits at a time by operation of a second one of said elevator cars.

13. In an elevator system, a structure having a plurality of floors, a plurality of elevator cars, a separate floor selector for each of the elevator cars, a source of

direct current, means including a plurality of contact devices on each of said floor selectors for controlling circuits from said source in accordance with the position of the associated elevator cars, and separate unidirectional rectifier means connecting each of the contact devices on one of the floor selectors to the corresponding contact device on another of the floor selectors, whereby portions of cir-

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uits controlled by the floor selectors associated with said rectifier means may be connected through the rectifier means to be simultaneously effective only under predetermined conditions.

No references cited.