

Sept. 27, 1955

W. F. EAMES

2,718,935

ELEVATOR SYSTEMS

Filed Sept. 28, 1953

7 Sheets-Sheet 1

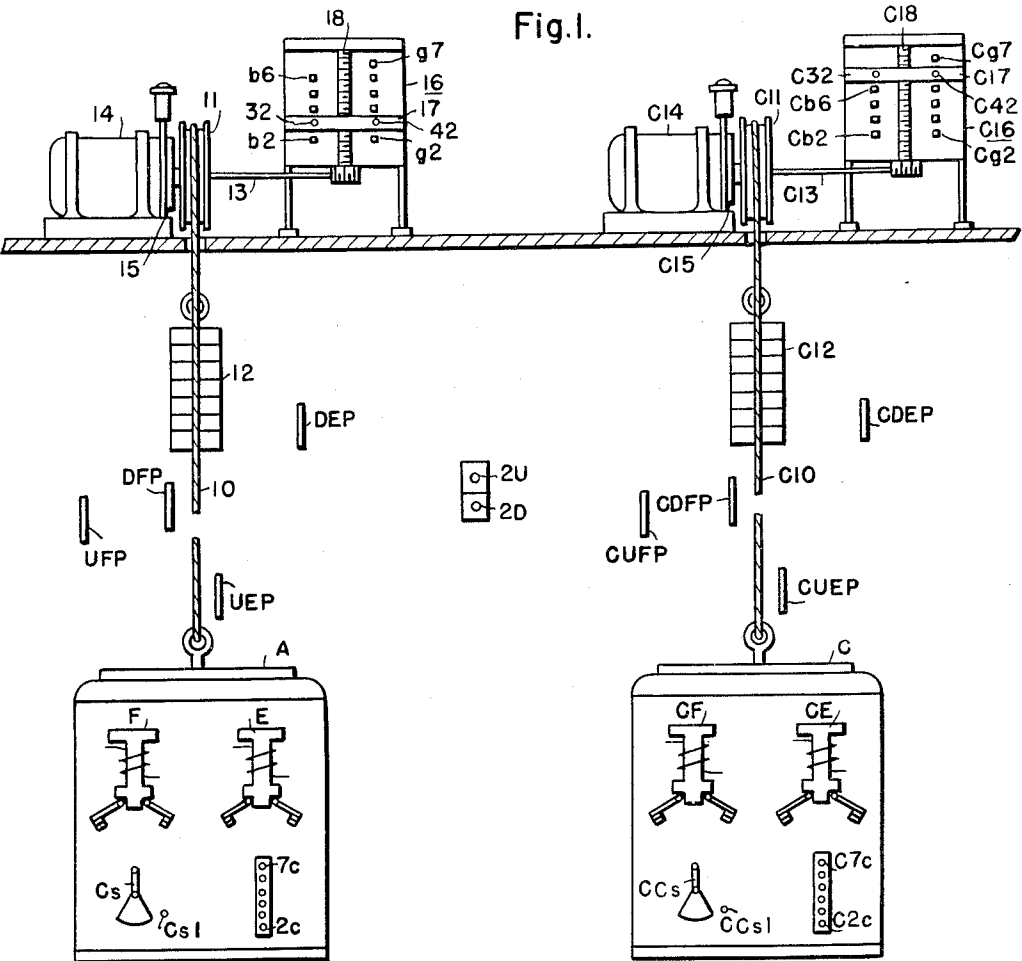
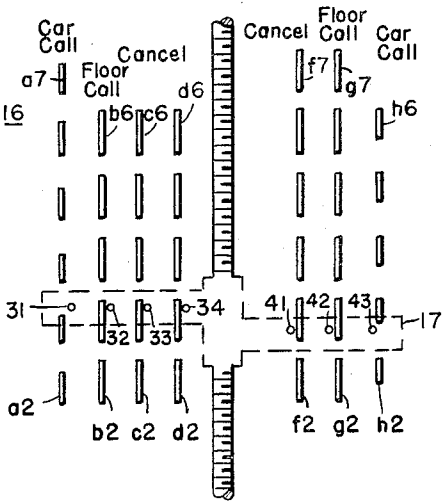


Fig. 2.



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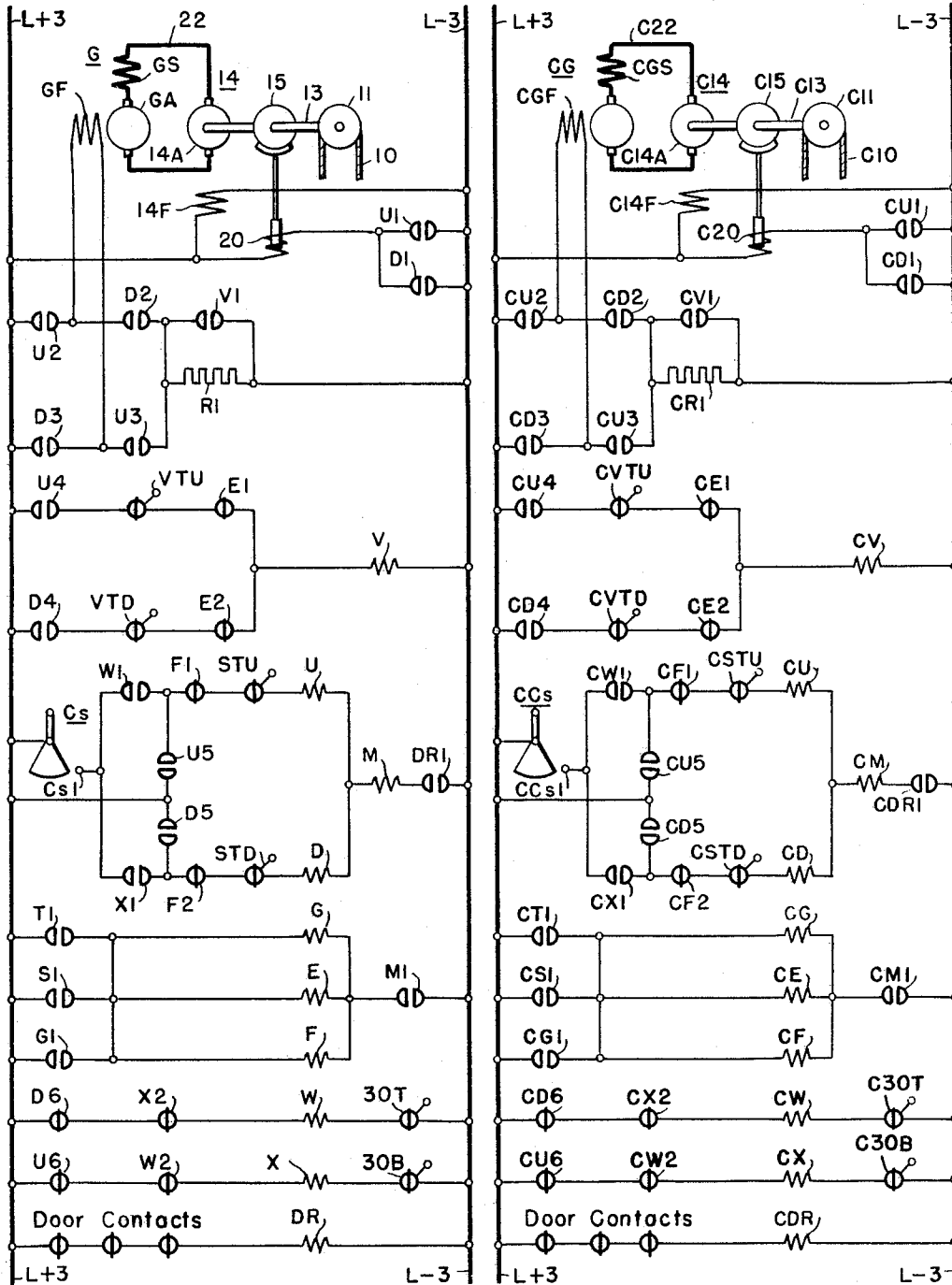
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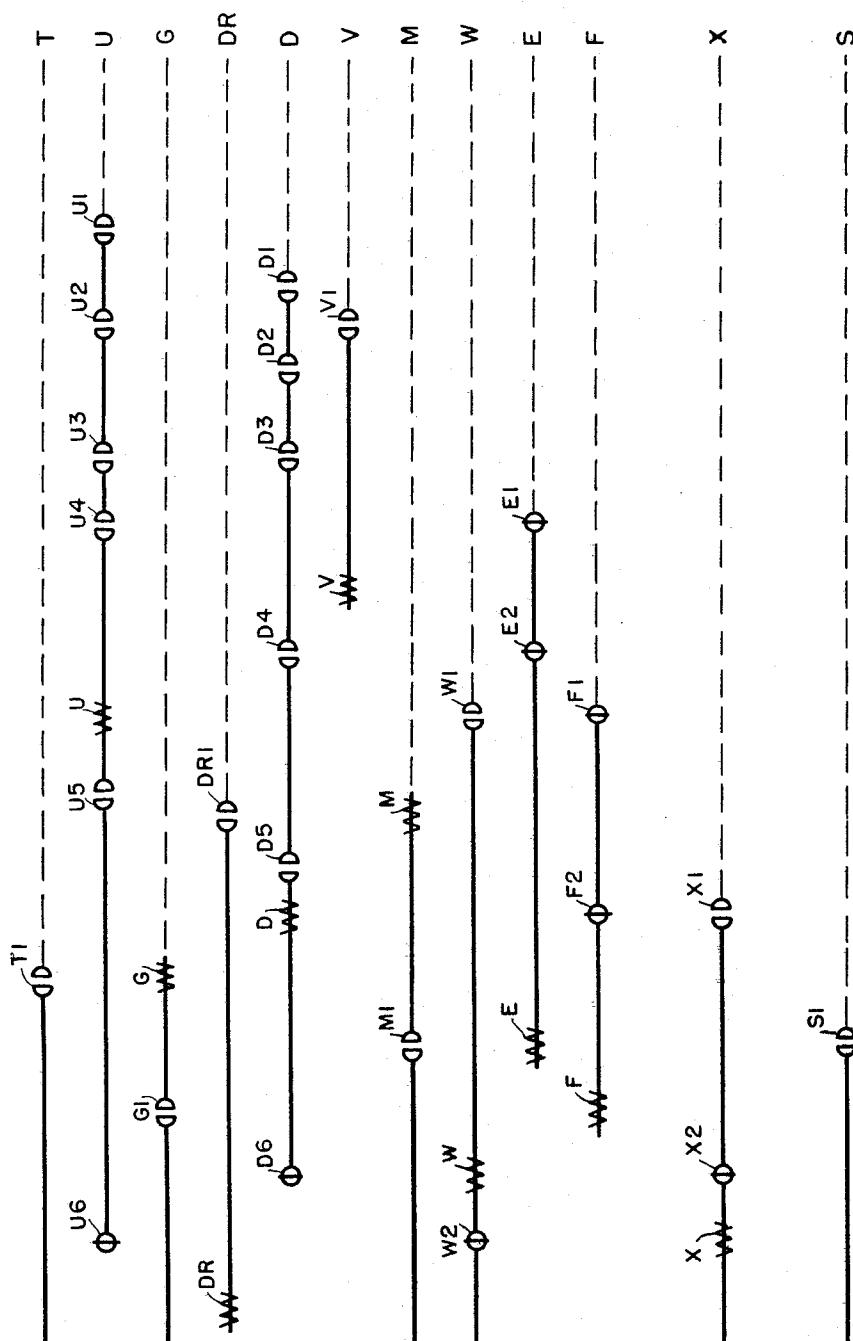
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Fig. 3A.

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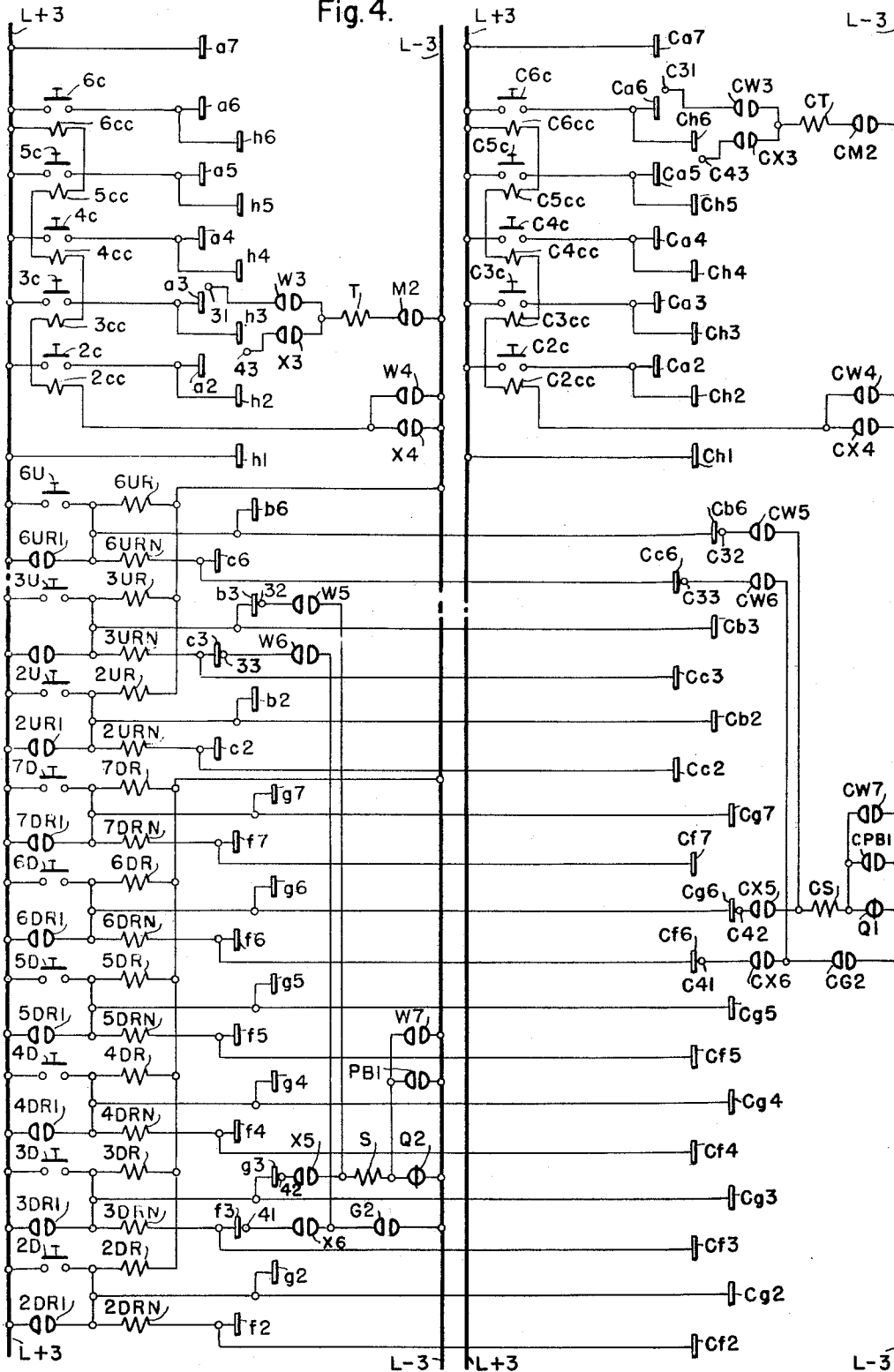
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Fig. 4.



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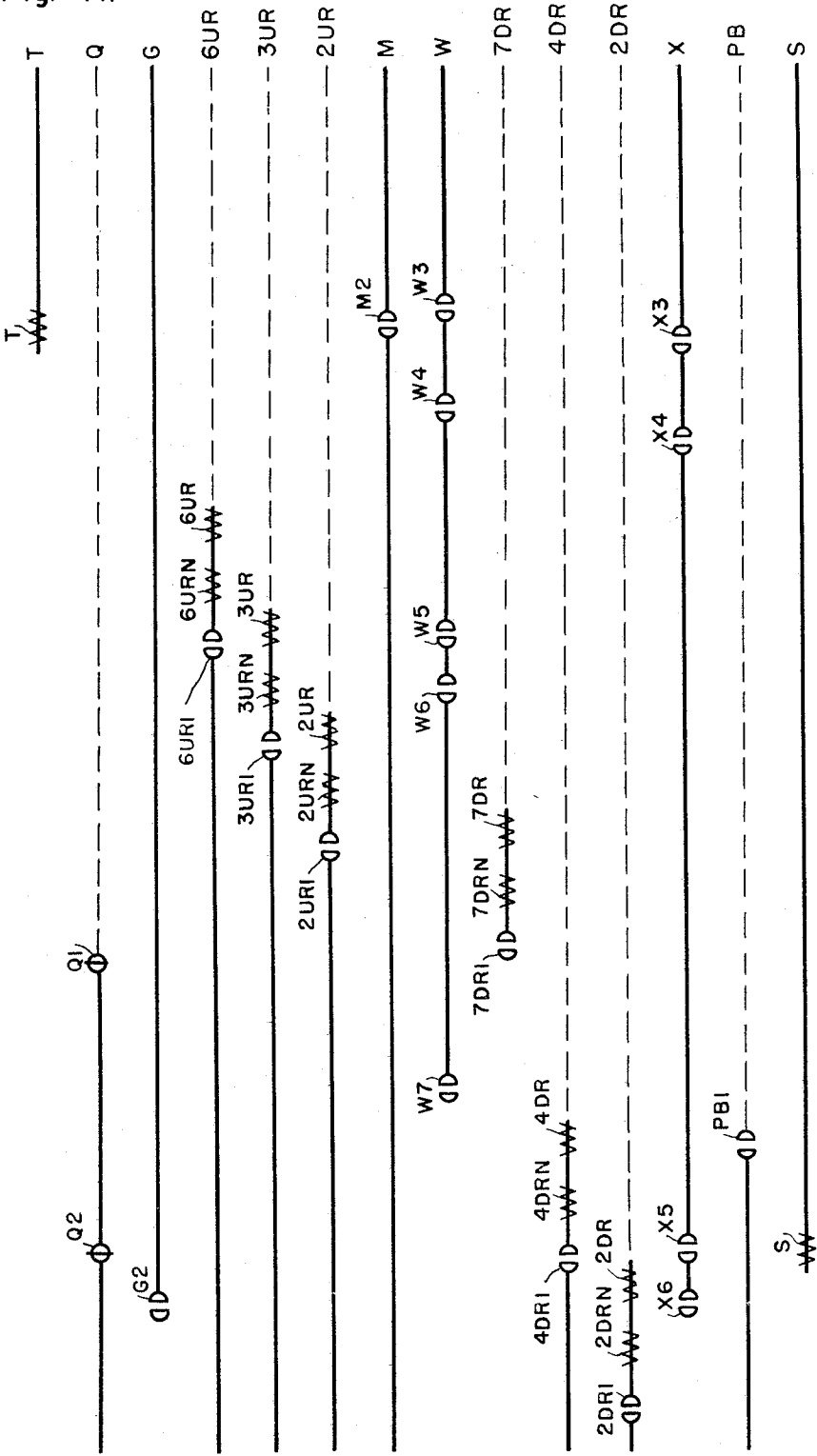
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Fig. 4A.



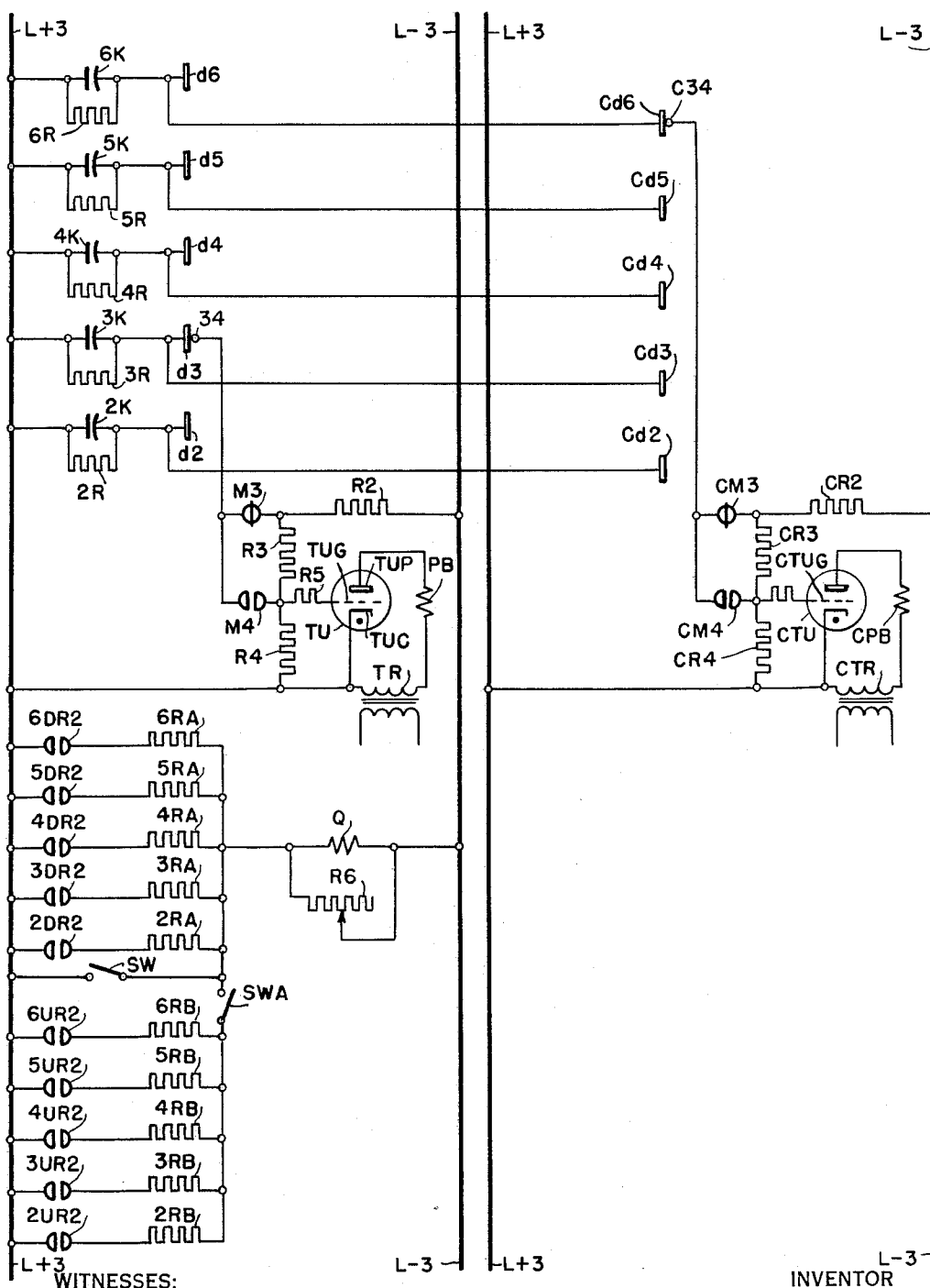
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Fig. 5.

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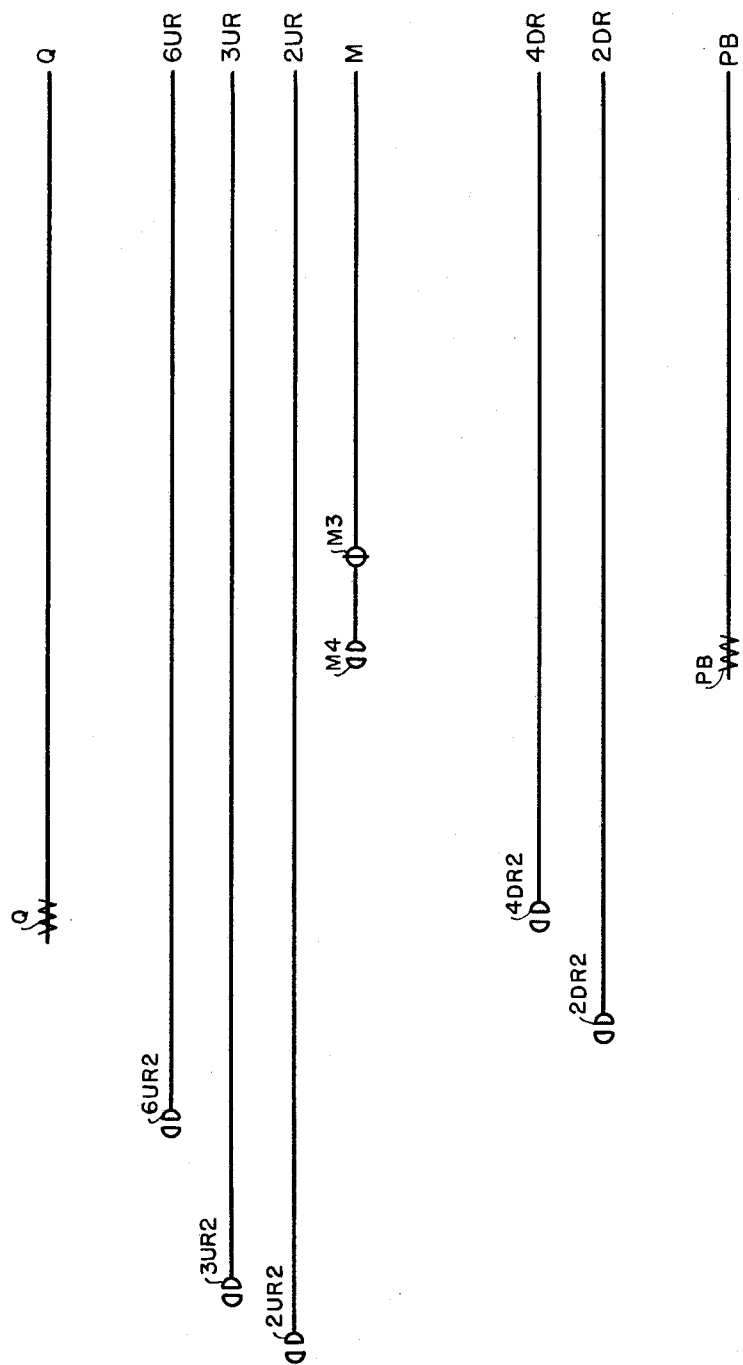


Fig. 5A.

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2,718,935

ELEVATOR SYSTEMS

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Application September 28, 1953, Serial No. 382,747

25 Claims. (Cl. 187—29)

This invention relates to elevator systems having floor or corridor call registration devices and it has particular relation to elevator systems wherein the elevator cars stop automatically in response to calls for service registered by the call registration devices.

In an elevator system a substantial amount of time is consumed for each stop made by an elevator car. The loss of time includes that required for the elevator car to slow down as it approaches a floor, to stop, open its doors, unload and load passengers, reclose its doors and accelerate away from the floor.

To illustrate the problem with greater particularity, reference may be made to an elevator system wherein an elevator car has stopped at a floor and has received a load. As the elevator car leaves the floor, a call for service may be reregistered from the floor by one or two intending passengers. If an elevator car stops promptly in response to the reregistered call for elevator service, it follows that only one or two passengers may board the elevator car during the stop. The stopping time per passenger is thus comparatively high and the efficiency of the elevator system in moving passengers is low.

The inefficient operation of the elevator systems discussed above is objectionable in elevator systems wherein the elevator cars are operated by attendants. However, the loss in efficiency is particularly objectionable in automatic elevator systems wherein the elevator cars are operated without attendants. In the latter case, the elevator car doors are generally operated at low speeds. For this reason and other reasons, each elevator car may consume a greater amount of time for each stop which it makes.

In accordance with the invention, an elevator system is provided wherein after an elevator car has stopped at a floor while set for travel in a predetermined direction, further service for calls reregistered from the floor is prevented for a time. To this end the system may be arranged to measure a time interval following the stopping of each of the elevator cars at a floor. During the time interval the control apparatus for the elevator system is modified. In a preferred embodiment of the invention the control apparatus is arranged to bypass elevator cars past the floor for the duration of the time interval being measured.

The invention may be employed for calls for service in the up direction or the down direction. In most installations, the invention is particularly suitable for controlling the stopping of the elevator cars in response to calls for down service.

Although the invention may be arranged for continuous operation in the foregoing manner, preferably the operation is made dependent on traffic conditions. As examples of traffic conditions which may be employed for control purposes, reference may be made to conditions such as the total number of calls for elevator service registered, the number of calls for service in the down direction which are registered, the rate at which the elevator cars make stops, the loading of the elevator cars and the rate of call registration. More than one of the traffic conditions may be employed for control purposes if so desired. In a preferred embodiment of the invention, the operation is dependent on the number of calls for down service which are registered.

It is therefore an object of the invention to provide

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an elevator system wherein further service for a call from a floor is prevented for a period following the stopping of an elevator car at such floor.

It is a further object of the invention to provide an elevator system wherein a time period is measured following the stopping of an elevator car at a floor.

It is also an object of the invention to provide an elevator system wherein an elevator car when set for travel in a predetermined direction is arranged to stop at a floor in response to a call from such floor for service in the predetermined direction and wherein further service for calls registered from such floor in the predetermined direction is prevented for a time period following a stopping and departure of the elevator car.

It is an additional object of the invention to provide an elevator system as defined in the preceding paragraph wherein the prevention of service is permitted only during the existence of a predetermined traffic condition.

Other objects of my 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.

Fig. 2 is a diagrammatic representation of the stationary contact segments and the moving brushes on a floor selector for one of the elevator cars embodied in Fig. 1, with the brushes disposed in the position they take when the car is stopped at the third floor.

Figs. 3, 4 and 5 collectively constitute a diagrammatic representation in straight-line style of the circuit connections for the two-car elevator system illustrated in Fig. 1. The figures should be assembled vertically in numerical order with Fig. 3 at the top.

Figs. 3A to 5A, inclusive, are key representations of the relays in Figs. 3 to 5, inclusive, illustrating the coils and contact members disposed in horizontal alignment with their positions in the straight-line circuits of Figs. 3 to 5. Figs. 3A to 5A should be placed beside the corresponding Figs. 3 to 5 to facilitate the location of the various coils and contacts.

Each relay or its 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 two cars A and C for serving seven 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 characters except that the apparatus for car C is given the prefix C to indicate that it is for car C instead of for car A.

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 direction switch
- V—high speed relay
- W—up direction preference relay
- X—down direction preference relay
- DR—door relay
- PB—automatic by-pass relay

Apparatus common to all cars:

7DR	Down call-storing relays
6DR	
5DR	
4DR	
3DR	
2DR	
6UR	Up call-storing relays
5UR	
4UR	
3UR	
2UR	
Q—quota relay	

Apparatus in Fig. 1 of the drawings

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 position to correspond to the floors of the building. For simplicity, only two brushes, 32 and 42, and two rows of contact segments b2 and g2, 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 car switch Cs is mounted in the car to be operated by the attendant to start the car. When the car switch is rotated anticlockwise, it closes its contacts Cs1 to start the car for 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.

Car buttons 2c, etc. (one for each floor) are mounted in the car, so that the 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. 3.

Hall or floor buttons are mounted at the floor landings, in order that waiting passengers may cause the cars to stop thereat. 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 call button 2D for the second floor.

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 ma-

terial, mounted in the hatchway adjacent to each floor. Each numeral prefix in the reference character for a button designates the floor with which the button is associated. 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

Fig. 2 illustrates an enlarged view of the floor selector 16 of Fig. 1. In this figure, the various stationary contact segments are represented by rectangles and most of the contacting brushes by small circles. The brush carriage 17 is shown by dotted lines in the position it occupies when the associated car is stopped at the third floor. Each numeral suffix in the reference character for a contact segment designates the floor with which the contact segment is associated.

The contact segments a2 to a7 on the floor selector are disposed to be successively engaged by the brush 31 for completing stop circuits set up by the call push buttons in the car for up direction stops.

The contact segments b2 to b6 and the brush 32 are for connecting the circuits of the stop buttons 2U, etc. at the floor landings for up stops. The up contact segments c2 to c6 and the brush 33 are provided for connecting circuits for cancelling stop calls registered by the up hall call buttons 2U, etc. The up contact segments d2 to d6 and the brush 34 connect circuits for the by-pass relay to be described later. The down cancel contact segments f2, etc. and brush 41, the down floor call contact segments g2, etc. and brush 42, and the down car call contact segments h2, etc. and brush 43 are provided for connecting circuits for the down direction in the same manner as described for the up direction.

Apparatus in Fig. 3

Referring particularly to Fig. 3 of the drawings, it will be observed that control circuits are shown on the left-hand side which are individual to car A. At the right-hand side, the circuits shown are individual to car C and are similar to the circuits of car A.

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

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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 master or car switch CS located in 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 contact members U2, U3 and D2, 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.

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 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 SFU 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 by a top limit switch 30T, a bottom limit switch 30B and the high-call reversal relays. 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. Hence the car attendant does not need to do anything except close or open the car switch Cs and operate the car call buttons.

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 hall 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. 4 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 conventional door safety contacts.

Apparatus in Fig. 4

The car buttons 2c, etc. described in connection with Fig. 1, are illustrated with their holding coils 2cc, etc., and circuit in the upper part of Fig. 4, in connection with the stopping relay T. The coils 2cc, etc., are energized when the car starts in either direction to hold in the car buttons 2c, 3c, etc., as they are operated, until the direction of the car is reversed, so that the temporary operation of a car button by the attendant will cause it to remain in operated condition until the car is reversed. Energy for the various control operations is derived from the direct current conductors or buses L+, L-3.

The car call stopping relay T is connected to the up brush 31 engaging the row of contact segments a2, etc., and to the down brush 43 engaging the row of contact segments h2, etc., so that, when a call is registered on a

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car button and the car approaches the energized contact segment corresponding thereto, relay T will be energized to stop the car by energizing the inductor relays F and E. The brushes and contact segments may be so related that as the elevator car stops at a floor while set for up travel the brush 31 passes slightly beyond the contact segment for such floor. Similarly if the elevator car while set for down travel stops at a floor, the brush 43 may pass slightly beyond the contact segment for such floor.

The floor or hall buttons 2U, 2D, etc., described in connection with Fig. 1 are shown with their circuits in the lower part of Fig. 4. Associated with each floor button is a call registering or storing relay by means of which the momentary pressing of the buttons will set up or register a stop call which will hold itself until it is answered by the stopping of a car at that floor for the direction of the registered call. The call registering relays are designated as 2DR to 7DR for the down direction and as 2UR, 3UR and 6UR for the up direction. Each numeral prefix in these reference characters designates the floor with which the relay is associated. For simplicity, the up direction registering relays and floor buttons for only the second, third and sixth floors are shown, as the up buttons and registering relays for the other floors will be readily understood.

The down call registering relays, when energized, close circuits to the row of contact segments g2, etc., and the up registering relays, when energized, close circuits to the row of contact segments b2, etc., on the floor selector so that the contact segment for a floor for which a call is registered is energized as long as the call exists.

A floor call stopping relay S is shown as connected to the down brush 42 engaging segment g2, etc., (and to the up brush 32 which engages the segments b2, etc.). When the car approaches a floor in a down direction for which a down call is registered, the corresponding brush engages the energized contact segment for that floor and thereby causes the relay S to be energized, which, in turn, energizes the inductor relays F and E of that car to effect the stopping of that car at that floor.

For the floor call stopping relay S to be energized during car down travel the make contacts PB1 of a bypass relay or the break contacts Q2 of a quota relay must be closed. These relays are discussed below. During up travel of the elevator car these contacts may be shunted by make contacts W7 of the up direction preference relay.

A cancellation coil is wound in opposition to each call registering coil and connected to the cancellation contact segments on the floor selector. The up cancellation coils are designated as 2URN, etc., connected to the up segments c2, etc., and the down cancellation coils as 2DRN, etc., connected to the down segments f2, etc., of all of the cars. As the brush 33 (or C33) moves over the segments c2, etc. (or Cc2, etc.) of the car A or C) and the brush 41 (or C41) moves over the segments f2, etc. (or Cf2 etc.), they energize the cancellation coil for any floor at which a car stops to answer a stop call.

Contacts of the relays G, M, W and X are shown for controlling the connections of various circuits. It is believed that such contacts may be traced readily on the drawing and that their purposes will be apparent from the discussion herein presented.

Apparatus in Fig. 5

In Fig. 5 circuits are illustrated for controlling the bypass relay PB and the quota relay Q.

The bypass relay PB is associated with a row of contact segments d2 etc., which are mounted on the floor selector 16 of Fig. 1. As the elevator car A descends from the upper terminal to the lower terminal floor, a brush 34 successively engages the contact segments d6 to d2. Each of the contact segments is connected to a

similar contact segment for each additional elevator car employed in the system.

Each of the contact segments *d2* to *d6* is connected to the bus *L+3* through a timing circuit. The timing circuit conveniently may include an energy storage device such as a capacitor and a discharge device such as a resistor. For example the contact segment *d2* is connected to the bus *L+3* through a storage capacitor *2K* which has connected thereacross a discharge resistor *2R*. In a similar manner each of the remaining contact segments *d3* to *d6* is connected to the bus *L+3* through a capacitor respectively *3K* to *6K* and a resistor respectively *3R* to *6R*. Each of the capacitors and its associated resistor may be referred to as an RC timing circuit.

Each of the RC timing circuits is employed for controlling the operation of the bypass relay *PB* as the elevator car during down travel approaches the floor associated with each of the timing circuits. The bypass relay conveniently may be energized through a discharge device such as an electronic tube. Although the tube may be of the high vacuum type, preferably it is of the gaseous discharge type known as a thyratron. By inspection of Fig. 5 it will be noted that the bypass relay *PB* is connected through the secondary winding of a transformer *TR* across the plate electrode *TUP* and the cathode electrode *TUC* of the tube *TU*. The primary winding of the transformer *TR* may be energized from a suitable source of alternating current such as a conventional power source operating at a frequency of 60 cycles per second.

The discharge between the plate and cathode electrodes of the tube *TU* is controlled by a control or grid electrode *TUG* which is normally biased from a voltage divider represented by the resistors *R2*, *R3* and *R4* which are connected in series across the buses *L+3* and *L-3*. It will be noted that the control electrode *TUG* is connected through a resistor *R5* to a point intermediate the resistors *R3* and *R4*. Consequently the control electrode *TUG* normally is biased negatively with respect to the cathode electrode *TUC* by a voltage represented by the drop across the resistor *R4*.

The brush *34* is connected to the voltage divider and the tube *TU* in either or two manners. When the elevator car is stopped the break contacts *M3* of the car running relay *M* are closed to connect the brush *34* through the resistor *R2* to the bus *L-3*.

If the elevator car is running the make contacts *M4* of the car running relay *M* are closed to connect the brush *34* through the resistor *R5* to the control electrode *TUG*.

Let it be assumed that the elevator car *A* during a trip in the down direction is approaching the third floor. As the elevator car nears the third floor the brush *34* engages the contact segment *d3* to connect the capacitor *3K* and the resistor *3R* across the resistor *R4*. If the voltage across the capacitor *3K* is equal to or greater than the voltage drop across the resistor *R4*, at the moment the brush *34* engages the contact segment *d3*, it follows that the negative bias of the control electrode *TUG* is not decreased and the tube *TU* does not fire. Consequently the bypass relay *PB* remains deenergized.

However, if the voltage across the capacitor *3K* at this time is substantially smaller than the voltage drop across the resistor *R4*, it follows that the negative bias of the control electrode *TUG* is decreased by the engagement of the contact segment *d3* with the brush *34*. This decrease may be sufficient to fire the tube *TU* and pick up the bypass relay *PB*. The resistance value of the resistor *3R* may be small compared to the resistance values of the resistors *R3* and *R4*.

As the elevator car *A* stops at the third floor, the make contacts *M4* of the car running relay *M* open and the break contacts *M3* close to connect the resistor *R2* in series with the brush *34*, the contact segment *d3* and the parallel combination of the capacitor *3K* and the resistor *3R* across the buses *L+3* and *L-3*. The resistance value of

the resistor *R2* may be small compared to the resistance value of the resistor *3R*. As a result of such connection, the capacitor *3K* is substantially fully charged. Consequently as the elevator car *A* leaves the third floor the charge on the capacitor *3K* is sufficient to prevent the energization of any of the bypass relays which is placed under the control of the capacitor. It will be understood that as the elevator car *A* leaves the third floor the charge on the capacitor *3K* starts to decay through the resistor *3R* in accordance with a well-known law. Consequently by proper selection of the values of the capacitor *3K* and the resistor *3R*, the time period during which the charge on the capacitor is sufficient to prevent energization of a bypass relay may be preselected. If desired the resistor *3R* may be adjustable to permit adjustment of the time period.

The bypass relay *PB* may be continuously effective for controlling the bypassing of the elevator car *A*. Under such circumstances the quota relay *Q* is permanently connected through a switch *SW* across the buses *L+3* and *L-3*.

If it is desired to permit energization of the quota relay *Q* only under predetermined traffic conditions the switch *SW* is opened. Under such circumstances the quota relay *Q* is connected across the buses *L+3* and *L-3* through a parallel circuit having a plurality of arms one for each of a plurality of the floors served by the elevator cars. In a specific embodiment of Fig. 5, five parallel arms are provided and are associated respectively with the second to sixth floors. Each of the arms includes a resistor respectively *2RA* to *6RA* and a set of make contacts respectively *2DR2* to *6DR2* of the down call storing relays for the second to sixth floors. If desired a similar parallel arm may be provided for the seventh floor. However, in the present embodiment it will be assumed that the additional arm is not employed.

The quota relay is adjusted to pick up only if more than a predetermined number of the make contacts *2DR2* to *6DR2* are closed. This number may be controlled by the adjustment of a resistor *R6* which is connected across the coil of the relay *Q*. For present purposes it will be assumed that energization of the quota relay *Q* through two or more of the arms is sufficient to pick up the relay.

If desired, the energization of the quota relay *Q* may be effected not only through the parallel arms associated with the down call starting relay but also parallel arms associated with the up call starting relays. In this case the switch *SWA* is closed. As a result of such closure the quota relay *Q* may be energized not only through the previously mounted parallel arms but in addition may be energized through five additional parallel arms. These latter arms include respectively the resistors *2RB* to *6RB* and the make contacts *2UR2* to *6UR2* of the up call starting relays respectively for the second to the sixth floors.

Basic operation—car C

It is believed that the invention may be understood more readily by following the elevator cars through some typical operating sequences. For the initial sequence it will be assumed that the elevator car *C* is to proceed in the up direction from the ground floor.

Assuming that the car *C* is at the ground floor with its doors open to receive passengers, the up direction preference relay *CW* (Fig. 3) will be energized. This is true for the reason that arrival of the car at the ground or reference floor actuates the limit switch *C30B* which is opened to deenergize the down direction preference relay *CX*. Closure of the back contacts *CX2* of the relay *CX* establishes an energizing circuit for the up direction preference relay *CW* across the supply conductors *L+3*, *L-3* through the back contacts *CD6* of the down switch and the closed contacts of the upper limit switch *C30T*.

Closure of the doors of the car *C* results in energization of the door relay *CDR*, and closure of the car switch

CCs completes an energizing circuit for the up direction switch CU and the car running relay CM. This circuit may be traced from the supply conductor L+3 through the switch CCs, front contacts CW1 of the up direction preference relay, back contacts CF1 of the stopping inductor relay, closed contacts of the limit switch CSTU, the winding of the up switch CU, the winding of the car running relay CM and the contacts DR1 of the door relay DR to the supply conductor L-3. Energization of the up switch CU results in establishment of a holding circuit therefor through the front contacts CU5 of the switch.

The switch CU also closes its contacts CU1 to release the brake C15 and closes its contacts CU2, CU3 to energize the field winding CGF with proper polarity to initiate movement of the car C in an up direction. It will be recalled that closure of the contacts CU2, CU3 energizes the field winding CGF through the resistor CR1.

The high speed relay CV is energized in response to closure of the contact CU4 of the up switch through the limit switch CVTU and the back contacts CE1 of the slowdown inductor relay. This results in closure of the contact CV1 to shunt the resistor CR1 and conditions the car C for high speed operation.

Car C runs up at full speed and stops for all up floor calls or all up car calls. It will be recalled that an up floor call results in energization of the floor call stopping relay CS (Fig. 4) to close the contacts CS1 (Fig. 3). Furthermore, a car call results in energization of the car call stopping relay CT (Fig. 4) to close the contacts CT1 (Fig. 3). Closure of either of the contacts CS1 or CT1 energizes the slowdown inductor relay winding CE, the stopping inductor relay winding CF and the inductor holding relay CG which closes its contacts CG1 to maintain the windings energized. While these windings are energized, if the car C passes an up plate CUEP (Fig. 1), contacts CE1 (Fig. 3) are opened to deenergize the high speed relay CV. This results in the slowing down of the car C. As the car C passes the up plate CUFP (Fig. 1), the stopping inductor relay CF picks up to open its contacts CF1 and consequently deenergizes the up switch CU and the car running relay CM. The resulting opening of the up switch contacts CU2 and CU3 deenergizes the field winding CGF and the opening of the contact CU1 results in application of the brake to stop the car C at the desired floor. The deenergization of the car running relay CM results in opening of the contacts CM1 and deenergizes the slowdown inductor relay CE, the stopping inductor relay CF and the inductor holding relay CG. After the car C has stopped for an up call, it is restarted in the manner previously discussed.

When the car C arrives at the upper terminal floor, the car call stopping relay CT (Fig. 4) is energized from the contact segments Ca7 of the associated floor selector. Energization of the car call stopping relay CT results in the stopping of the car at the seventh floor in the manner previously discussed. Arrival of the car C at the seventh floor results in opening of the upper limit switch C30T (Fig. 3) to deenergize the up direction preference relay CW. This relay consequently closes the back contacts CW2 to energize the down direction preference relay CX (the contacts CU6 and the lower limit switch C30B are closed). This conditions the car C for a return to the reference or ground floor.

At the expiration of the predetermined dispatching interval (which may be instantaneous in the present case), the car C receives a dispatching signal and the operator closes his doors to energize the door relay CDR. It will be recalled that this relay is energized when the doors are closed and deenergized when the doors are opened. The operator closes the car switch CCs to energize the down switch CD and the car running relay CM. The energizing circuit may be traced from the supply conductor L+3 through the car switch CCs, front contacts CX1 of the down direction preference relay, back con-

tacts CF2 of the stopping inductor relay, closed contacts of the bottom limit switch CSTD, the windings of the down switch CD, the car running relay CM and the make contacts CDR of the door relay to the supply conductor L-3. Contacts CD5 of the down switch CD close to establish a holding circuit for the switch. In addition, the down switch CD closes its contacts CD1 to release the brake C15 and closes its contacts CD2 and CD3 to energize the field winding CGF and start the car C on its down trip. Closure of the contacts CD4 of the down switch energizes the high speed relay CV to shunt the resistor CR1 and condition the car C for high speed operation.

As the car C moves toward the ground or reference floor, car calls result in the energization of the car call stopping relay CT (Fig. 4) to stop the car C at the desired floor. Furthermore, down floor calls which are registered energize the floor car stopping relay CS (Fig. 4) of the car C to stop the car at the desired floor in order to accept passengers desiring transportation to a lower floor. The relays CT and CS operate in a conventional manner to stop the car C at the desired floor. After completion of the desired stop, the car C may be started in a conventional manner to proceed towards the ground or reference floor.

As car C approaches the ground floor, the car call stopping relay CT is energized by engagement of the contact segment Ch1 (Fig. 4) by the brush C43 to stop the car C at the ground or reference floor in a conventional manner. Also in approaching the ground floor, the down direction preference relay CX (Fig. 3) is deenergized in response to opening of the bottom limit switch C30B. In opening, the down direction preference relay CX conditions the up direction preference relay CW for energization.

Bypass operation

Next it will be assumed that the elevator car C is leaving the sixth floor in the down direction when calls are registered at the third and fifth floors for elevator service in the down direction. Since the elevator car C is set for travel in the down direction, the down direction preference relay CX, the door relay DR, the down switch CD, the high speed relay CV and the car running relay CM all are energized and picked up.

The down call at the third floor was registered by operation of the push button 3D (Fig. 4) to connect the down call starting relay 3DR across the buses L+3 and L-3. As a result of its energization this relay closes its make contacts 3DR1 to establish a self-holding circuit. In addition, make contacts 3DR2 (Fig. 5) close to energize the quota relay Q through the resistor 3RA. Such energization is insufficient to pick up the quota relay Q. It is assumed that the switches SW and SWA are open.

The down call at the fifth floor was registered by operation of the push button 5D (Fig. 4). As a result of its energization the down call starting relay 5DR closes its self-holding contacts 5DR1 and its make contacts 5DR2 (Fig. 5) to energize the quota relay Q through the resistor 5RA.

Under the assumed conditions the energization of the quota relay Q through the resistors 3RA and 5RA is sufficient to pick up the quota relay. This relay opens its break contacts Q1 and Q2 (Fig. 4) to prevent energization therethrough of the floor call stopping relays S and CS.

As the car continues its downward travel it approaches the fifth floor and the brush C34 (Fig. 5) finally engages the contact segment Cd5 to connect the capacitor 5K and its associated resistor 5R through the closed make contacts CM4 across the resistor CR4. It is assumed that the capacitor 5K has had its charge dissipated through the resistor 5R sufficiently to reduce the negative bias of the control electrode CTUG to a value low enough to permit the tube CTU to fire. Consequently

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the tube fires and the bypass relay CPB picks up to close its make contacts CPB1 (Fig. 4).

In its continued approach towards the fifth floor the elevator car C brings its brush C42 into engagement with the contact segments Cg5 to complete the following circuit: L+3, 5DR1, Cg5, C42, CX5, CS, CPB1, L-3. It should be noted that the contacts CW7 and Q1 both are open. Consequently the energization of the floor call stopping relay CS is effected only because the make contacts CPB1 are closed.

The energized floor call stopping relay CS now closes its make contacts CS1 (Fig. 3) to complete with the closed contacts CM1 energizing circuits for the relays CG, CE and CF. These relays cooperate to initiate a stopping operation of the elevator car at the fifth floor by a sequence which will be clear from the preceding discussion.

In stopping at the fifth floor it will be recalled that the car running relay CM is deenergized and drops out. Consequently make contacts CM4 are opened and the normal negative bias of the tube CTU is restored to interrupt the energization of the bypass relay CPB. This relay consequently opens its make contacts CPB1 (Fig. 4).

In addition the make contacts CM3 (Fig. 5) close to complete the following circuit: L+3, 5K and 5R in parallel, Cd5, C34, CM3, CR2, L-3. The capacitor 5K now is substantially fully charged.

It will be understood further that as the elevator car C stops at the fifth floor, the make contacts CG2 (Fig. 4) close to complete the following cancelling circuit: L+3, 5DR1, 5DRN, Cj5, C41, CX6, CG2, L-3. The resultant neutralization of the down call storing relay 5DR results in opening of the self-holding contacts 5DR1 and opening of the make contacts 5DR2 (Fig. 5). Since the quota relay Q is now energized through only one of the parallel arms, the relay Q drops out and closes its break contacts Q1 and Q2 (Fig. 4).

The elevator car attendant now opens his doors, receives the passengers at the fifth floor, recloses his doors and starts down from the fifth floor by a sequence which will be clear from the preceding discussion.

It will be assumed that the elevator car C was fully loaded at the fifth floor and that a remaining prospective passenger reregistered the down call as the elevator car left his floor. Such reregistration was effected by operation of the push button 5D (Fig. 4) to energize the down call starting relay 5DR. When energized this relay closes its self-holding contacts 5DR1 and its make contacts 5DR2 (Fig. 5). The quota relay Q is now energized through the resistors 3RA and 5RA and consequently is energized sufficiently to pick up. The quota relay thereupon opens its break contacts Q1 and Q2 (Fig. 4).

It will be assumed further that as the elevator car C passes the fourth floor a down call is registered at the fourth floor by operation of the push button 4D (Fig. 4). As a result of its operation the push button 4D completes an energizing circuit for the down call starting relay 4DR and this relay closes its self-holding contacts 4DR1 and its make contacts 4DR2 (Fig. 5), without immediately affecting the operation of the system.

As a result of the continued movement of the elevator car C the brush C34 engages the contact segment Cd3 (Fig. 5) to connect the capacitor 3K and its resistor 3R through make contacts CM4 across the resistor CR4. Under the assumed conditions the capacitor 3K has a charge which is too low to prevent firing of the tube CTU and this tube consequently fires to energize the bypass relay CPB. The relay CPB closes its make contacts CPB1 (Fig. 4).

In its approach to the third floor the elevator car C causes its brush C42 to engage the contact segment Cg3 to complete the following circuit: L+3, 3DR1, Cg3, C42, CX5, CS, CPB1, L-3. Inasmuch as the contacts

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CW7 and Q1 are open such energization is possible only because of the closure of the make contacts CPB1.

The floor call stopping relay CS now initiates a stopping operation of the elevator car C at the third floor by a sequence which will be clear from the preceding discussion. Following its stop at the third floor the elevator car C may proceed to the lower terminal floor by a sequence similar to that previously discussed.

When the elevator car C stopped at the third floor the resulting cancellation of the call at the third floor resulted in opening of the make contacts 3DR2 (Fig. 5). However, the continued energization of the quota relay Q through the resistors 5RA and 4RA is sufficient to maintain the relay picked up.

It will be assumed that during the foregoing operation of the elevator car C the elevator car A had proceeded to the upper terminal floor and was starting down at the time the elevator car C left the third floor. As the elevator car A nears the fifth floor the brush 34 (Fig. 5) engages the contact segment d5 to connect the capacitor 5K and the resistor 5R through the contacts M4 across the resistor R4. It is assumed that the charge on the capacitor 5K has not dropped to a value permitting firing of the tube TU. Consequently the bypass relay PB remains deenergized and the make contacts PB1 (Fig. 4) remain open. Since the contacts W7 and Q2 also are open under the assumed conditions, the floor call stopping relay S cannot be energized and the elevator car A cannot stop at the fifth floor in response to the registered down call.

The elevator car A now passes the fifth floor and approaches the fourth floor until its brush 34 (Fig. 5) engages the contact segment d4. This connects the capacitor 4K and the resistor 4R across the resistor R4 through the contacts M4. Under the assumed conditions the capacitor 4K has a charge which is sufficiently low to permit firing of the tube TU. Consequently the tube fires to energize the bypass relay PB and this relay closes its make contacts PB1 (Fig. 4) to permit energization of the floor call stopping relay S.

During its approach to the fourth floor, the brush 42 engages the contact segment g4 to complete the following circuit: L+3, 4DR1, g4, 42, X5, S, PB1, L-3. The energized floor call stopping relay S initiates a stopping operation of the elevator car A at the fourth floor by a sequence which will be clear from the preceding discussion.

As the elevator car A stops at the fourth floor the make contacts M4 (Fig. 5) open and the break contacts M3 close to complete the following circuit: L+3, 4K and 4R in parallel, d4, 34, M3, R2, L-3. The capacitor 4K consequently is substantially fully charged. Furthermore the opening of the make contacts M4 restores the normal negative bias to the tube TU and the discharge in this tube is terminated to deenergize the bypass relay PB. The bypass relay thereupon opens its make contacts PB1 (Fig. 4).

It will be understood that as the elevator car A stops at the fourth floor the down call at the fourth floor is cancelled and the make contacts 4DR2 (Fig. 5) open. Since the quota relay Q now is energized only through the resistor 5RA the relay drops out to close its break contacts Q1 and Q2. The elevator car A now proceeds in a normal manner to a lower terminal floor. During the return of the elevator car A the capacitor 5K (Fig. 5) may be assumed to lose its charge.

In this way the elevator cars during periods of substantial down travel are loaded in an efficient manner and provide minimum stopped time per passenger carried by the elevator cars.

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.

I claim as my invention:

1. In an elevator system, a structure having a plu-

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ality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including timing means for each of said floors, each of said timing means being responsive to a stopping of the elevator car at the associated floor for measuring a period of time following the departure of the elevator car from such associated floor, and means responsive to an operation of the timing means for each of the floors for modifying the control means for the period of time measured by the timing means.

2. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including call registering means for each of said floors, each of the call registering means being operable for registering a call for the associated floor, means responsive to operation of the call registering means for a floor for stopping the elevator car at such floor, timing means for each of said floors, each of said timing means being responsive to a predetermined operation of the elevator car for measuring a period of time, and bypass means responsive to a timing operation of the timing means for a floor for preventing the stopping of the elevator car in response to an operated one of said call registering means for the last-named floor.

3. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including call registering means for each of said floors, each of the call registering means being operable for registering a call for the associated floor, means responsive to operation of the call registering means for a floor for stopping the elevator car at such floor, timing means for each of said floors, each of said timing means being responsive to a stopping of the elevator car at the associated floor for measuring a period of time following the departure of the elevator car from such associated floor, and bypass means responsive to said timing means for preventing a second stopping of the elevator car at any of said floors in response to operations of the call registering means for service in a predetermined direction from the last-named floor for a period of time after the elevator car has stopped and departed from the last-named floor in said predetermined direction.

4. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including call registering means for each of said floors, each of the call registering means being operable for registering a call for the associated floor, and means responsive to stopping of the elevator car at any of said floors for preventing a similar stopping operation of the elevator car for a substantial time after the elevator car has stopped and departed from the last-named floor.

5. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator

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car at the floors, said control means including call registering means for each of said floors, each of the call registering means being operable for registering a call for the associated floor, timing means for each of said floors, each of said timing means being responsive to a predetermined stopping of the elevator car at the associated floor for measuring a period of time following the departure of the elevator car from such associated floor, and translating means for modifying a portion of said control means while said elevator car is adjacent any of said floors for which said period of time is being measured.

6. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including call registering means for each of said floors, each of the call registering means being operable for registering a call for the associated floor, electric energy storage means for each of said floors, means responsive to the stopping of the elevator car at any of said floors for changing the energy level of the associated storage means, and translating means responsive to the energy level of each of said storage means while the elevator car is adjacent the associated floor.

7. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including a separate capacitor for each of said floors, means responsive to a predetermined stopping of the elevator car at any of the floors for initiating a predetermined temporary change in the energy stored in the capacitor for the last-named floor, and translating means responsive to the energy level of each of said capacitors for controlling the ability of the elevator car to stop at the associated floor.

8. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including call registering means for each of said floors, each of the call registering means being operable for registering a call for the associated floor, and means responsive to registration of calls by the call registering means for initiating the stopping of the elevator car at floors for which the calls are registered, a separate capacitor for each of said floors, each of said capacitors having a timing discharge circuit, means responsive to a predetermined stopping of the elevator car at any of said floors in response to a call registered by the call registering means for charging the capacitor associated with the floor at which the elevator car stops, and means responsive to the charge on each of said capacitors for bypassing calls registered by said call registering means for the associated floor.

9. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering

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means for initiating a stopping operation of the elevator car at each floor approached by the elevator car for which a call is registered by the call registering means for the direction of approach of the elevator car, and means responsive to a stopping of the elevator car at a floor in response to a call registered by the first call registering means for preventing the stopping of the elevator car at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor even though the elevator car again approaches said last-named floor in the same direction.

10. An elevator system as claimed in claim 9 in combination with third means operable within the elevator car for initiating a stopping operation of the elevator car, and means responsive to the stopping of the elevator car within said substantial time at the last-named floor while set for travel on said direction of approach for cancelling a call for such floor registered by the first call registering means.

11. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering means for initiating a stopping operation of the elevator car at each floor approached by the elevator car for which a call is registered by the call registering means for the direction of approach of the elevator car, and bypass means responsive to a stopping of the elevator car at a floor in response to a call registered by the first call registering means for preventing the stopping of the elevator car at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor even though the elevator car again approaches said last-named floor in the same direction, said bypass means comprising separate timing means for each of said first call registering means, means responsive to a stopping of the elevator car in response to each of the first call-registering means for initiating a timing operation of the associated timing means and means responsive to each of the timing means when operated for rendering a call registered by the associated first call registering means ineffective to initiate a stopping of the elevator car until the timing means has completed a timing operation.

12. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering means for initiating a stopping operation of the elevator car at each floor approached by the elevator car for which a call is registered by the call registering means for the direction of approach of the elevator car, and bypass means responsive to a stopping of the elevator

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car at a floor in response to a call registered by the first call registering means for preventing the stopping of the elevator car at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor even though the elevator car again approaches said last-named floor in the same direction, said bypass means comprising a separate timing circuit including a capacitor for each of said first call registering means, means responsive to a stopping of an elevator car in response to each of the first call-registering means for initiating a timing operation wherein the energy stored in the associated capacitor is changed for a time cycle and then restored to the initial energy level, and means responsive to the energy stored in each of the capacitors after initiation of a time cycle for rendering a call registered by the associated first call-registering means ineffective substantially for the duration of the time cycle to initiate a stopping operation of the elevator car, said last-named registered call after completion of the time cycle being effective for initiating a stopping operation of the elevator car.

13. 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 floors, motive means for moving each of the elevator cars relative to the structure, and control means operable in cooperation with the motive means to move each of the elevator cars and to stop each of the elevator cars at said floors, said control means including timing means for each of said floors, each of said timing means being responsive to a stopping of any of the elevator cars at the associated floor for measuring a substantial period of time.

14. 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 floors, motive means for moving each of the elevator cars relative to the structure, and control means operable in cooperation with the motive means to move each of the elevator cars and to stop each of the elevator cars at said floors, said control means including call registering means operable for registering a call for each of said floors, means responsive to operation of the call registering means for any of said floors for stopping the first available one of said elevator cars which approaches the floor of the operated call registering means in proper direction to answer the operated call registering means, timing means for each of said floors, each of said timing means being responsive to the stopping of any of the elevator cars at a floor in response to an operated one of said call registering means for measuring a substantial period of time extending substantially beyond the departure of the stopped elevator car from the floor at which it stopped.

15. A system as claimed in claim 14 in combination with means effective during said last-named measurement of a substantial period of time for preventing during the period of such measurement the stopping of any of the elevator cars at the last-named floor in response to operation of the call-registering means for the last-named floor.

16. A system as claimed in claim 14 wherein each of the timing means includes energy storage means and means responsive to the stopping of any of the elevator cars at any of the floors in response to a call registered by the call registering means for changing the energy level of the associated storage means at a predetermined rate, and translating means responsive to the energy level of each of the storage means while any of the elevator cars is adjacent the associated floor.

17. 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 floors, motive means for moving the elevator cars relative to

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the structure, and control means operable in cooperation with the motive means to move the elevator cars and to stop the elevator cars at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering means for initiating a stopping operation of the first available one of the elevator cars at each floor approached by the first available one of the elevator cars for which a call is registered by the call registering means for the direction of approach of the first available one of the elevator cars, and means responsive to a stopping of one of the elevator cars at a floor in response to a call registered by the first call registering means for preventing the stopping of any of the elevator cars at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor.

18. An elevator system as claimed in claim 17 in combination with third means operable within each of the elevator cars for initiating a stopping operation of the associated elevator car, and means responsive to the stopping of any of the elevator cars within said substantial time at the last-named floor while set for travel in said first direction for cancelling a call for service for such floor registered by the first call registering means.

19. 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 floors, motive means for moving the elevator cars relative to the structure, and control means operable in cooperation with the motive means to move the elevator cars and to stop the elevator cars at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering means for initiating a stopping operation of the first available one of the elevator cars at each floor approached by the first available one of the elevator cars for which a call is registered by the call registering means for the direction of approach of the first available one of the elevator cars, and bypass means responsive to a stopping of one of the elevator cars at a floor in response to a call registered by the first call registering means for preventing the stopping of any of the elevator cars at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor, said bypass means comprising a separate timing circuit including a capacitor for each of said first call registering means, means responsive to a stopping of an elevator car in response to each of the first call-registering means for initiating a timing operation wherein the energy stored in the associated capacitor is changed for a time cycle and then restored to the initial energy level, and means responsive to the energy stored in each of the capacitors after initiation of a time cycle for rendering a call registered by the associated first call-registering means ineffective substantially for the duration of the time cycle to initiate a stopping operation of any of the elevator cars, said last-named registered call after completion of the time cycle being effective for initiating a stopping operation of any of the elevator cars.

20. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive

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means to move the elevator car and to stop the elevator car at the floors, said control means including call registering means for each of said floors, each operable for registering a call for the associated floor, means responsive to operation of the call registering means for a floor for stopping the elevator car at such floor, timing means for each of said floors, each of said timing means being responsive to a predetermined operation of the elevator car for measuring a period of time, bypass means responsive to a predetermined traffic condition for being transferred from ineffective to effective condition, said bypass means only when in the effective one of said conditions being responsive to a timing operation of the timing means for a floor for preventing the stopping of the elevator car in response to an operated one of said call registering means for the last-named floor.

21. A system as claimed in claim 20 wherein said traffic condition comprises registration of a predetermined number of calls for elevator service by said call registration means.

22. In an elevator system, a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the floors, motive means for moving the elevator car relative to the structure, and control means operable in cooperation with the motive means to move the elevator car and to stop the elevator car at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering means for initiating a stopping operation of the elevator car at each floor approached by the elevator car for which a call is registered by the call registering means for the direction of approach of the elevator car, and bypass means responsive to the number of calls registered by at least a predetermined part of said call registering means for being transferred from ineffective to effective condition, said bypass means only when in the effective one of said conditions being responsive to a stopping of the elevator car at a floor in response to a call registered by the first call registering means for preventing the stopping of the elevator car at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor even though the elevator car again approaches said last-named floor in the same direction.

23. 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 floors, motive means for moving each of the elevator cars relative to the structure, and control means operable in cooperation with the motive means to move each of the elevator cars and to stop each of the elevator cars at said floors, said control means including call registering means operable for registering a call for each of said floors, means responsive to operation of the call registering means for any of said floors for stopping the first available one of said elevator cars which approaches the floor of the operated call registering means in proper direction to answer the operated call registering means, timing means for each of said floors, each of said timing means being responsive to the stopping of any of the elevator cars at a floor in response to an operated one of said call registering means for measuring a substantial period of time extending substantially beyond the departure of the stopped elevator car from the floor at which it stopped, bypass means responsive to a predetermined traffic condition for being transferred from ineffective to effective condition, said bypass means only while in the effective one of said conditions preventing the stopping of the elevator cars in response to the call

registering means at any of the floors for which the timing means is measuring said period of time.

24. 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 floors, motive means for moving the elevator cars relative to the structure, and control means operable in cooperation with the motive means to move the elevator cars and to stop the elevator cars at the floors, said control means including first call registering means for each of a plurality of the floors operable for registering calls for elevator service in a first direction from the floors, second call-registering means for each of a plurality of the floors operable for registering calls for elevator service in a second direction from the floors, means responsive to said call-registering means for initiating a stopping operation of the first available one of the elevator cars at each floor approached by the first available one of the elevator cars for which a call is registered by the call registering means for the direction of approach by the first available one of the elevator cars, and bypass means responsive to the number of calls registered at least by said

first call-registering means for transferring from ineffective to effective condition, said bypass means only when in the effective one of said conditions being responsive to a stopping of one of the elevator cars at a floor in response to a call registered by the first call registering means for preventing the stopping of any of the elevator cars at the last-named floor in response to a subsequent call registered by said first call-registering means for a substantial time after said stopping of the elevator car and departure of the elevator car from said last-named floor.

25. In a control system for a plurality of elevator cars operable past a floor, stop-control mechanism including a push button for such floor effective in response to operation of such push button for causing one of the elevator cars to stop at the floor, timing mechanism for measuring time, and means responsive to a predetermined operating condition of the control system for preventing the stopping of one of the elevator cars at the floor until after the timing mechanism has measured a predetermined time.

No references cited.