

July 12, 1960

J. E. MAGEE

2,944,634

PREDICTED STOP DEMAND

Filed July 24, 1959

7 Sheets-Sheet 1

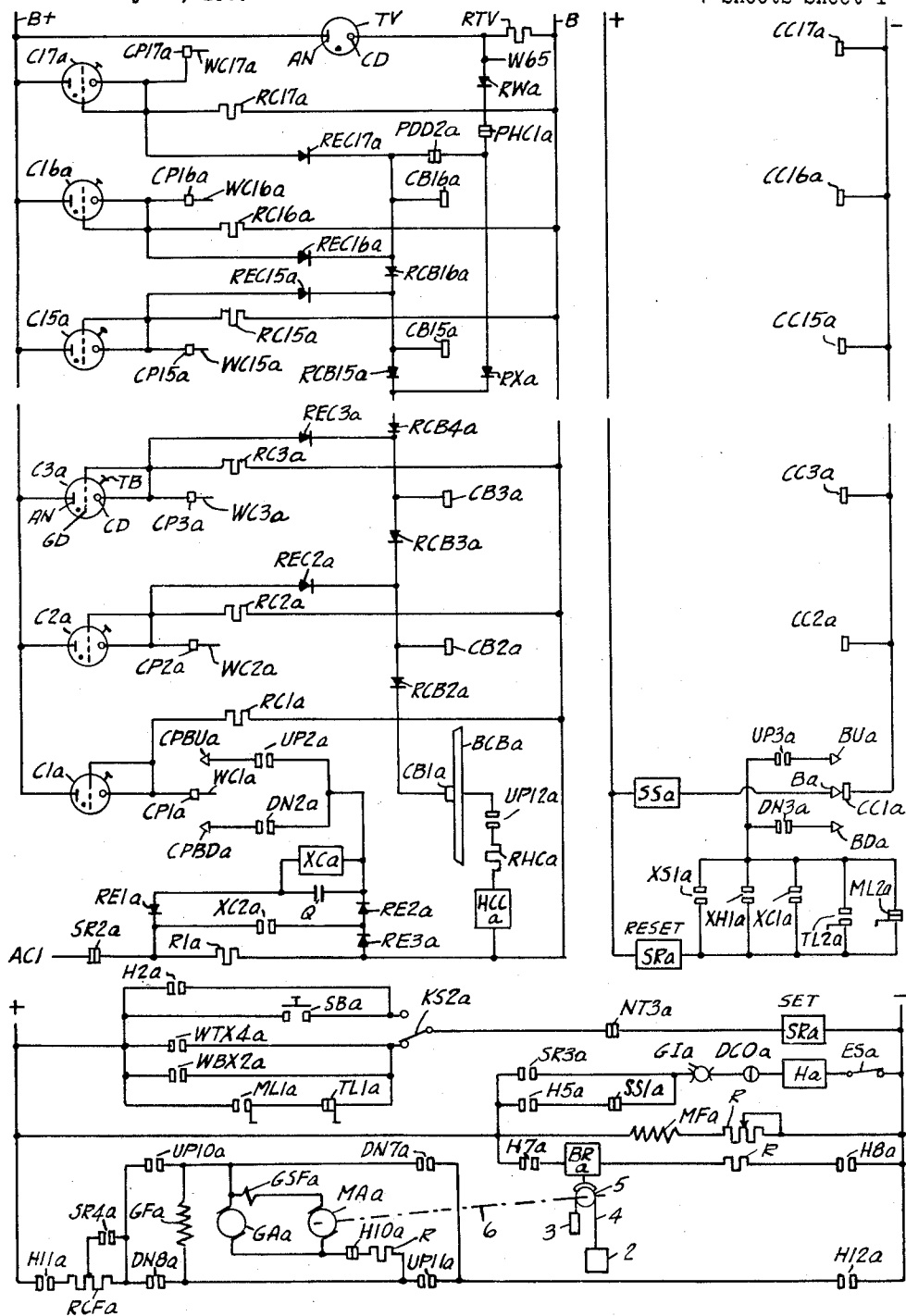


FIG. 1

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7 Sheets-Sheet 2

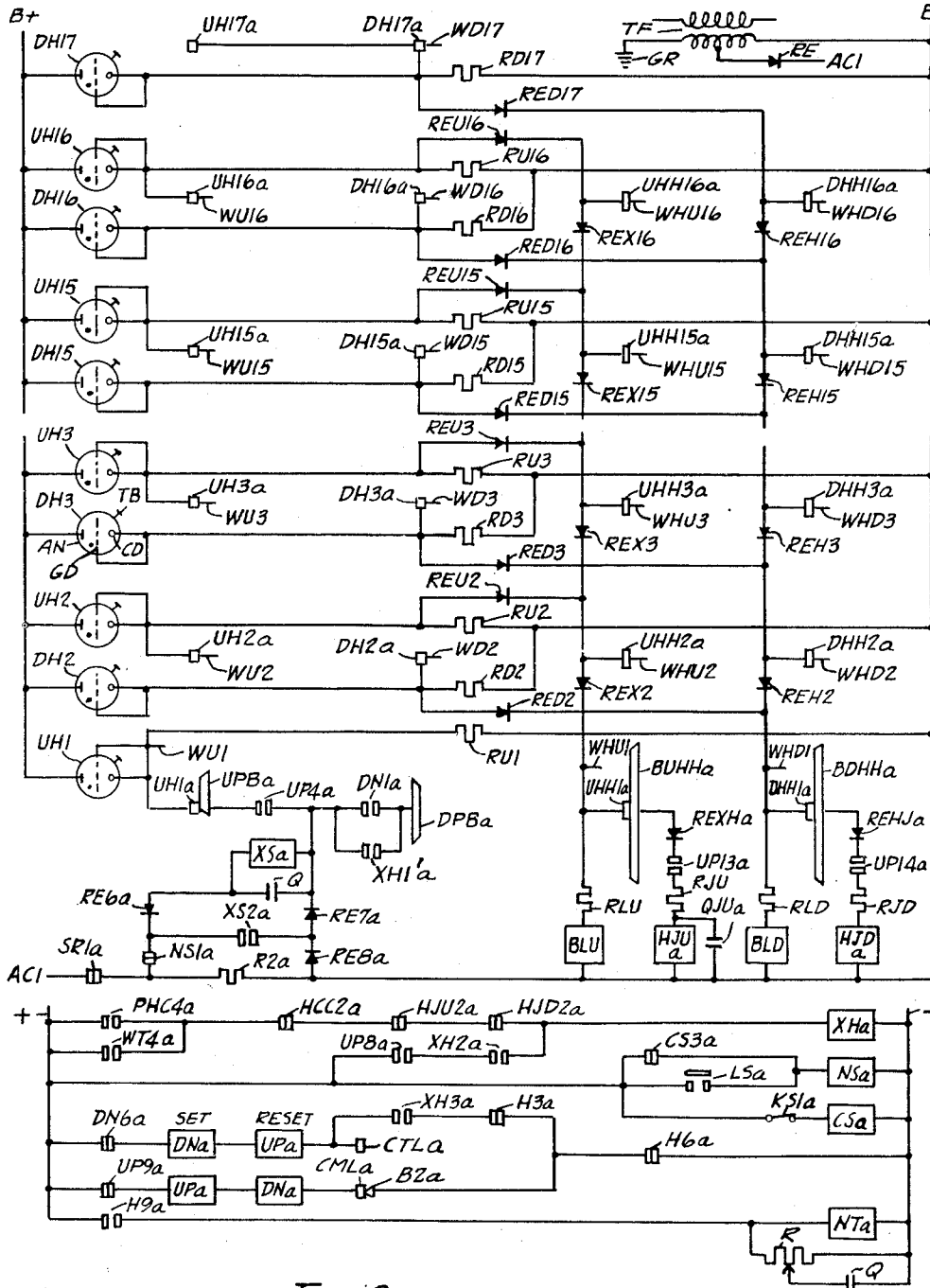


FIG. 2

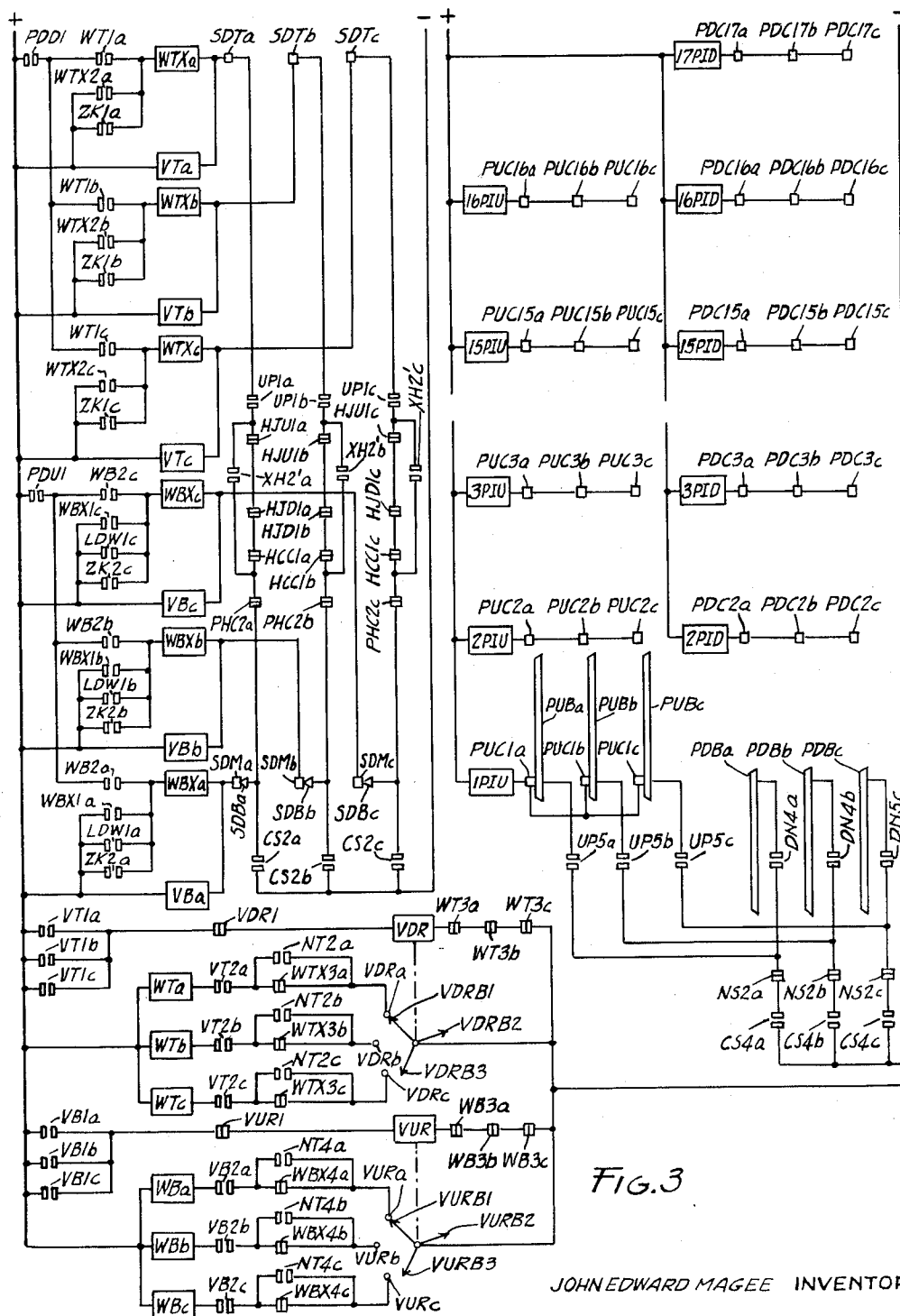
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7 Sheets-Sheet 3



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7 Sheets-Sheet 5

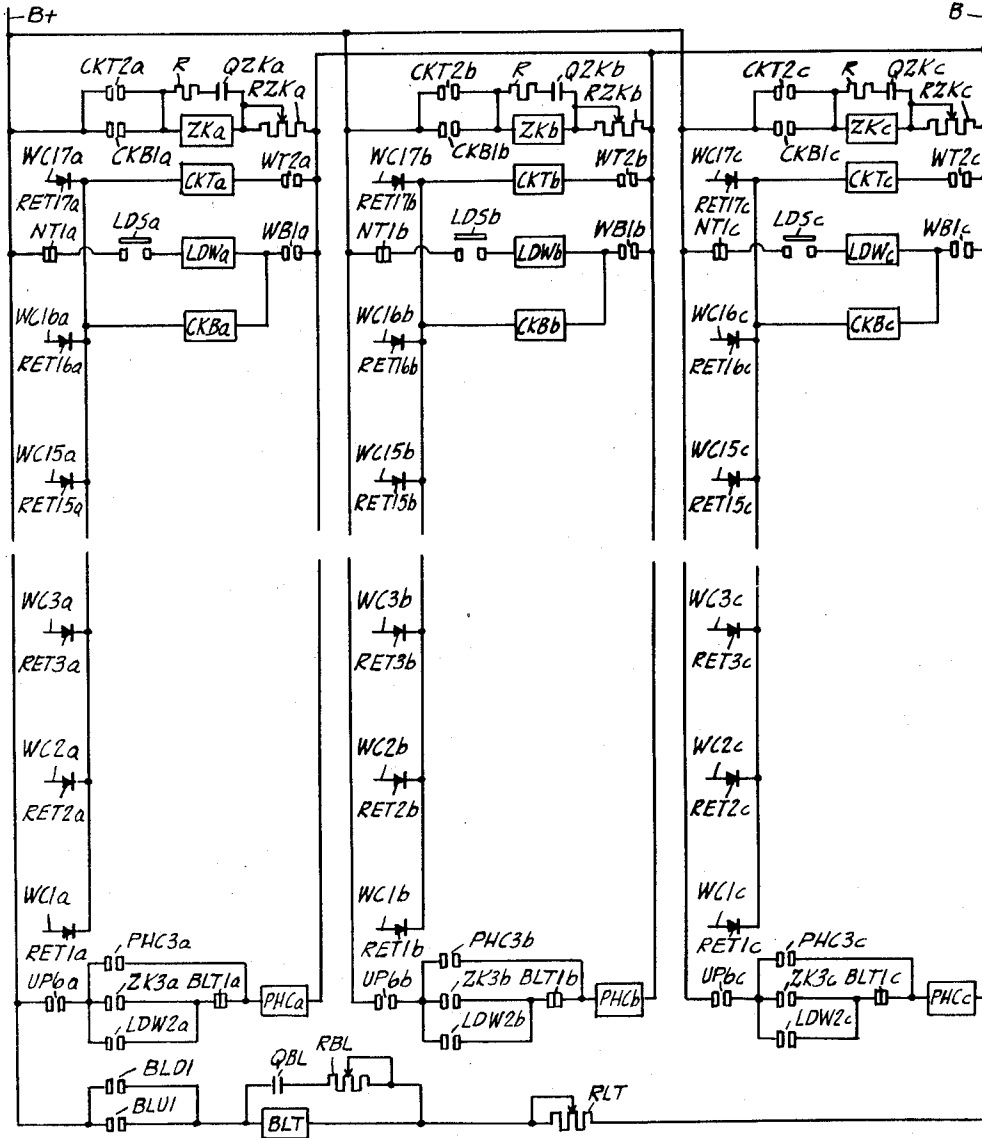


FIG. 5

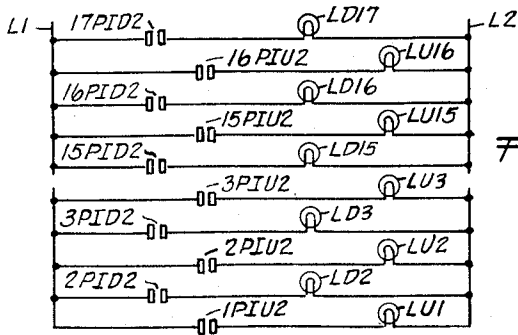


FIG. 6

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2,944,634

PREDICTED STOP DEMAND

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32 Claims. (Cl. 187—29)

The invention relates to dispatching and control systems for a plurality of elevators operating as a group.

It is desirable in modern day elevator installations to control the operation of a group of elevators in such manner that, during periods of interim traffic, the elevator cars arrive at each landing at predetermined spaced intervals. Furthermore, it is desirable to vary these spaced intervals in accordance with the number of cars in service and the existing actual demand for service. It is also beneficial to operate the elevator cars so as to give greater service in a given direction of travel when the demand in such direction is greater.

The invention involves accomplishing the foregoing by effecting the dispatching and control of each individual car in response to variations in actual registered demand and anticipated demand ahead of it. With this arrangement, transient peaks of actual registered demand affect only one car of the group and provide an immediate response to such demand without disrupting group operation. If a peak condition persists beyond the transient stage, other cars respond, as needed. Such a system provides efficient service for interim traffic conditions, accommodates slight variations in demand, and responds quickly to transient peak traffic conditions. Furthermore, such a system has a relatively high operating efficiency and is extremely flexible.

It is therefore an object of the invention to provide a dispatching and control system for a group of elevators in which the response of the cars to demands for service at the landings is on an individual car basis in accordance with the combined anticipated and registered demand to which each car is subject.

In carrying out the invention according to the preferred embodiment, a predicted demand factor is established for each direction of travel from each landing of a building. This predicted demand factor is determined in accordance with the service characteristics of the tenancy of that landing and the type of service required by such tenancy and is utilized as part of the total demand to effect dispatching of the cars. Registered landing calls are also a part of the total demand. The predicted demand and registered demand are totalized up to the position of the car next preceding the one selected as next to be dispatched. When such totalized demand reaches a predetermined amount for the particular installation, the selected car is dispatched. In this manner, the system tends to serve each landing with regularity according to its anticipated needs, which regularity is automatically modified by the registration of demand at the landings. The removal or addition of a car from group operation automatically changes the amount of totalized demand utilized to effect the dispatching of a car.

In accordance with the arrangement illustrated, a certain portion of the registered and predicted demand ahead of the next preceding car may be added to the totalized predicted and registered demand behind that car to determine when the selected car is dispatched.

Car calls in the selected car are preferably included as

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registered demand affecting that car, but it is preferred to limit their effect in each car to one call. In this manner the registration of more than one car call in the selected car cannot unduly affect its dispatching and thereby obviates the effect of passenger manipulation of the control system by the registration of "false" car calls.

A next preceding car, when it is carrying a certain load, automatically bypasses landing calls and is disregarded in the measurement of the registered and predicted demand, and the car ahead of it is regarded as the next preceding car in making this measurement.

In the absence of a selected car at the upper dispatching landing when sufficient totalized demand exists for dispatching a car downward from that landing, an up traveling car which has entered a top selection zone is selected for down dispatching and such car is caused to reverse at the landing of its highest call or at the bottom of the top selection zone, whichever is higher, and be dispatched downward.

If a car call is registered in the selected car at the upper or lower dispatching landing for a certain period, the car is immediately dispatched. Also, if a selected car at the lower dispatching landing becomes loaded to a certain percentage of capacity, it is immediately dispatched.

A selected car at the lower dispatching landing is pre-ordained to reverse at its highest call under conditions where it has a car call registered for a certain period or becomes loaded to a certain percentage of its capacity, provided that, in each case, when such condition arises, all previously existing landing calls have been answered for at least a certain time and any landing call registered subsequent to that time has not been registered for at least a certain period.

Features and advantages of the invention will be seen from the above, from the following description of the operation of the preferred embodiment when considered in conjunction with the drawings and from the appended claims.

In the drawings:

Figure 1 is a simplified schematic wiring diagram of a portion of the elevator power and control circuits for one car of the group, including car call registration circuits, car call pickup and canceling circuits, car call above circuits, and slowdown and stop initiating circuits;

Figure 2 is a simplified schematic wiring diagram of another portion of the elevator control circuits and landing call pickup and canceling circuits for one car of the group, along with landing call registration circuits, landing call above circuits, and landing call in registration circuits common to all cars of the group;

Figure 3 is a simplified schematic wiring diagram of car availability circuits, car selecting circuits, dispatching circuits, and car position and direction sensing circuits for the group;

Figure 4 is a simplified schematic wiring diagram of predicted and registered demand totalizing circuits;

Figure 5 is a simplified schematic wiring diagram of preordained highest call reversal circuits;

Figure 6 is a simplified wiring diagram of car position and direction indicating circuits common to the cars; and

Figures 7 and 8 are spindle sheets for use in side-by-side alignment with Figures 1 through 6 for locating the coils and contacts in Figures 1 through 6, the number of the figure in which a particular coil or pair of contacts appears being appended, following a dash, to the particular designation for that coil or pair of contacts.

The invention will be described, for convenience, as a control and dispatching system for a three car group of elevators serving 17 landings, designated 1 through 17. In the arrangement illustrated the 1st landing is the lower dispatching landing, and the 17th landing is the upper dispatching landing. It will be understood that the prin-

ciples of the invention are equally applicable to elevator installations having different numbers of landings, different numbers of cars and different landings utilized as dispatching landings.

The circuits for some of the intermediate landings have been omitted, for the sake of brevity, and it is to be understood that the circuits for such intermediate landings are intended to be similar to those illustrated for other intermediate landings.

For the sake of brevity, the power and control circuits for the car and hoistway doors have not been shown, it being understood that they are of the conventional automatic door opening and closing type.

Differentiation will be made between the different elevators by appending to the characters, employed to designate the various elements of the system, lower case letters "a," "b" and "c," indicative of the different elevators.

The electromagnetic switches employed in the system illustrated are designated as follows:

BLD—Down landing call switch
BLT—Landing call time switch
BLU—Up landing call switch
CKB—Up selected car, car call switch
CKT—Down selected car, car call switch
CS—Car in service switch
DN—Down direction switch
H—Field and brake switch
HCC—Highest car call switch
HJD—Highest down landing call switch
HJU—Highest up landing call switch
LDW—Up selected car load switch
NS—Non-stop switch
NT—Time delay switch
PDD—Summation down demand switch
PDU—Summation up demand switch
PHC—Preordained highest call reversal switch
2PID—17PID—Down car position switches
1PIU—16PIU—Up car position switches
SR—Starting and slowdown switch
SS—Stopping switch
UP—Up direction switch
VB—Available up car switch
VDR—Down notching switch
VT—Available down car switch
VUR—Up notching switch
WB—Up selected car switch
WBX—Up dispatched holding switch
WT—Down selected car switch
WTX—Auxiliary down selected car switch
XC—Car call pick-up switch
XH—Car reversal switch
XS—Landing call pick-up switch
ZK—Car call time switch

In the wiring diagrams, the foregoing identifying letters are applied to the coils of the electromagnetic switches and, with reference numerals appended thereto, are applied to the contacts of the switches to differentiate between different sets of contacts on the same switch, all contacts being shown for the unoperated condition of the switches. The numerical prefix designations of switches PID and PIU indicate the landings with which these switches are associated. Switches SR, DN and UP which are latching switches, each have two coils, one an operating coil and the other a reset coil and are shown in reset condition.

Switches VDR and VUR (Figure 3) are rotary stepping switches utilized in the selection of cars for dispatching. Switch VDR is provided for the upper dispatching landing and switch VUR for the lower dispatching landing. Each stepping switch is provided with a series of stationary contacts, one for each car, and preferably three rotary brushes positioned approximately 120° apart and adapted successively to engage the stationary contacts. These brushes, designated VDRB and VURB

and differentiated by numbers, are rotated counterclockwise in step-by-step movement by their respective operating coils VDR and VUR. The contacts engaged by the brushes are designated VDR and VUR. Successive de-energization of operating coils VDR and VUR to cause stepping operation is effected by contacts VDR1 and VUR1, respectively.

Manually operated switches are designated ES, KS1, KS2, SB, KSD and KSU.

In Figure 1, for simplicity, the circuits which are individual to each car are shown only for car a, it being understood that like circuits are provided for cars b and c. Car 2 connected to counterweight 3 is raised or lowered by means of hoisting roping 4 passing over sheave 5 mounted on shaft 6 of hoisting mechanism. The hoisting mechanism consists of a direct current hoisting motor having an armature MAa supplied with current at a variable voltage from a generator armature GAa which is rotated by a driving motor (not shown). The hoisting motor has a separately excited field winding designated MFa. The generator has a series field winding designated GSFa and a separately excited field winding GFa. Starting and slowdown switch SRA controls the strength of the generator separately excited field winding GFa by means of resistor RCFa, provided in the separately excited generator field circuit to effect deceleration of the car. BRA designates the release coil of the electromagnetic brake.

Mechanism actuated in accordance with movement of the elevator car is utilized in the circuits for each elevator. Such mechanism may be in the form of a conventional selector machine as described in connection with Figure 2 of the Glaser and Hornung Patent No. 2,589,242, but considerably simplified in accordance with the simplified circuits herein disclosed.

Shown in the wiring diagrams are the following brushes and the stationary contacts with which they cooperate:

Brushes:	Stationary contacts
BCB	CBI-16.
BDHH	DHH1-16.
BPD and 2BPD	PD1-17.
BPU and 2BPU	PU1-17.
BU, BD and B	CC1-17.
BUHH	UHH1-16.
BZ	CTL and CML.
CPBU and CPBD	CP1-17.
DPB	DH2-17.
PDB	PDC2-17.
PUB	PUC1-16.
SDB	SDT and SDM.
UPB	UH1-17.

For convenience, and as part of the simplification, it will be assumed that the selector machine is provided only with the synchronous panel and that brushes are carried by this panel in position to engage their corresponding stationary contacts which are mounted on floor bars on the selector. The brushes are shown for the condition in which all cars are at the lower dispatching landing.

Brushes designated BCB (Figure 1), BUHH, BDHH (Figure 2), PUB and PDB (Figure 3) are constructed so as to span momentarily two of their successive stationary contacts in traveling from one such contact to the next one. Brushes BU, BD, CPBU and CPBD (Figure 1) are positioned so as to engage their respective stationary contacts a predetermined slowdown distance ahead of the car with which they are associated arriving at the landing. Brushes UPB and DPB (Figure 2) are of the elongated type, adapted to engage their respective stationary contacts slightly before brushes BU and BD engage their respective stationary contacts. Brush pairs BPU, 2BPU and BPD and 2BPD (Figure 4) are so positioned that the one brush of each pair is in phase position with its associated car and the other brush is one landing behind, and each brush in each pair is constructed so as to

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span momentarily two of its associated successive stationary contacts in traveling from one such contact to the next one.

Main landing switch *MLa* and top landing switch *TLA* (Figure 1) are actuated by car movement as the car arrives at the lower dispatching landing and upper dispatching landing, respectively, their contacts being shown for the condition of car *a* parked at the lower dispatching landing. Hoistway door switch *DCOa* and car door switch *Gla* (Figure 1) are actuated by door movement, their contacts being shown for the closed condition of the doors. Load switch *LSa* (Figure 2) and load dispatch switch *LDSa* (Figure 5) may be microswitches located under the car platform in the conventional manner to be actuated by load in the car. For purposes of this embodiment, switch *LSa* is preset to be actuated when the load in the car is say 80% of capacity and switch *LDSa* is actuated when the load attains say 50% of capacity, both switches being shown in unactuated condition.

Referring to Figure 2, up landing call buttons are designated *UH* and down landing call buttons are designated *DH*, numerals being appended for indicating the landing for which the buttons are provided. Each of these landing call buttons *UH* and *DH* comprises a gas tube and a fixed button *TB* connected to the tube envelope with the circuits arranged so that the tube conducts in response to the touch of a finger on the button *TB* and remains conducting, thereby registering the call and enabling the touch to be discontinued. The primary of transformer *TF* may be supplied with alternating current from any suitable source to provide alternating current for the gas tube firing circuits and, over line *AC1*, to provide half wave rectified current for the automatic landing call cancelling circuits to extinguish the tubes. The structure and operation of the landing call registering circuits and automatic landing call cancelling circuits are more fully disclosed and described in the aforementioned Glaser and Hornung patent.

Transformer *TF* of Figure 2 likewise provides alternating current and half wave rectified current for the car call registration and cancelling circuits of Figure 1. Car call buttons are designated *C* and, as in the case of the landing call buttons *UH* and *DH*, have numerals appended thereto, indicative of the landing for which the car call buttons are provided. Each of these car call buttons *C* comprises a gas tube and fixed button *TB* of like construction and operation to landing call buttons *UH* and *DH*. A touch of a finger on fixed button *TB* by a passenger in the elevator car causes the tube to conduct and remain conducting, thereby registering the car call and enabling the touch to be discontinued. Tube *TV*, which relates to the control of the extent of upward travel of the cars, is of a gas diode type, which maintains a constant voltage drop across its anode-cathode electrodes. These car button circuits are shown only for car *a*, it being understood that they are the same for the other cars.

Although, for the sake of brevity, the highest landing call circuits, landing call pickup circuits and automatic landing call cancelling circuits (Figure 2) have been shown only for car *a*, like circuits are provided for each of the elevators of the group by interconnection of the selectors for each elevator, as indicated by cross-connecting wires *WU*, *WD*, *WHU* and *WHD* for the various landings. Interconnecting wires *WU* and *WD* also cross-connect the landing call registering circuits of Figure 2 with the demand totalizer circuits of Figure 4. The car call registering circuits for each elevator are interconnected to the circuits of Figure 5 by cross-connecting wires *WC*. The cathode electrode *CD* of diode *TV* is interconnected to the car call registering circuits (not shown) of the other elevators of the group by cross-connecting wire *W65*.

Shown in Figure 4 are the circuits for totalizing the predicted and registered demand for the car selected for

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up dispatching and that for the car selected for down dispatching. This registered and predicted demand for convenience is expressed in units of basic demand. Resistors, which will be termed demand resistors, are utilized for this purpose and are connected in parallel in the totalizing circuits to totalize the demand units to which a selected car is subject. The demand due to car calls registered for a car which is selected is totalized in the up demand totalizing circuit by means of car call demand resistors *RKBa-c* and in the down demand totalizing circuit by means of car call demand resistors *RCKa-c*. The demand due to registered landing calls is totalized in the up demand totalizing circuit by means of up landing call demand resistors *2RUR* through *16RUR* and down landing call demand resistor *17RDR* and in the down demand totalizing circuit by means of down landing call demand resistors *2RDR* through *16RDR* and up landing call demand resistor *1RUR*. The predicted demand established for each landing for each direction of travel is totalized in the up demand totalizing circuit by means of predicted up demand resistors *2PUR* through *16PUR* and predicted down demand resistor *17PDR* and in the down demand totalizing circuit by means of predicted down demand resistors *2PDR* through *16PDR* and predicted up demand resistor *1PUR*. The numerical prefix designations of landing call demand resistors *RUR*, *RDR* and predicted demand resistors *PUR*, *PDR*, indicate the landings for which the respective resistors are provided.

The ohmic value of each of these demand resistors is adjusted by positioning its adjustable tap in accordance with the weight in demand units to be given to the demand which it represents. The weight in demand units given to car calls registered for a car which is selected is preferably the same, regardless of the number of car calls registered. Relating these resistors to a one demand unit basis, a resistor having a weight of say five demand units has an ohmic value of one fifth that of a resistor representing one demand unit. Also, fractional units may be involved, as where say a resistor has a weight of one and three quarters demand units, in which case its ohmic value is four-sevenths that of a resistor representing one demand unit. When the total number of demand units to which the selected car is subject, represented by the ohmic values of the resistors connected in parallel in the totalizing circuit, reaches a certain amount, enough current flows in the totalizing circuit to effect a dispatching operation for that car, as will be explained in more detail later.

The demand totalizer circuits for up dispatching include the triode tube *PTU* which, when the demand is low, conducts insufficient current to operate summation up demand switch *PDU*. The amount of current flow through the tube is controlled by the potential applied to the grid of the tube. This in turn is determined by the position of adjustable tap *T1* on resistor *PDUR1* which fixes the number of totalized up demand units for applying a value of positive potential on the grid to cause the tube to conduct sufficient current to operate switch *PDU*. Similarly, demand totalizer circuits for down dispatching include the triode tube *PTD* and the position of adjustable tap *T1* on resistor *PDDR1* determines the number of totalized down demand units for applying a value of positive potential on the grid of the tube to cause the tube to conduct sufficient current to operate switch *PDD*. Switches *PDU* and *PDD* act to initiate dispatching of selected cars, as will be explained later. The number of totalized demand units for causing dispatching of a selected car under condition where one car of the group is removed from group operation, is determined by the positions of adjustable taps *T2* through *T4* on resistors *PDUR1* and *PDDR1*, as will be described.

It is to be understood that the number of totalized demand units for dispatching a car, the weight established for the individual predicted demand factors and for the

car call and landing call registered demand may vary in accordance with the characteristics of each particular installation. Furthermore, they may be readjusted in a particular installation, as experience and changes in tenancy dictate. Also, if it is desired for a particular installation, the predicted demand for a given direction of travel may be given more weight in establishing a demand for dispatching a selected car in that direction than the weight given to the predicted demand for dispatching a selected car in the opposite direction. For example, when an up traveling car stops in answer to a landing call, the entering passenger usually registers a car call for another landing, requiring that car to make a second stop before it reaches the upper dispatching landing. When a down traveling car stops in answer to landing calls, the entering passengers in many instances wish to travel directly to the lower dispatching landing. It therefore may be desirable to establish for the landings a greater predicted demand in the up direction than in the down direction.

Shown in Figure 6 are position indicating lamps designated LD and LU with numerals appended thereto, indicating the landings for which they are provided. The vertical row of lamps designated LD is provided for indicating the positions of cars traveling in the down direction, while the row of lamps designated LU is for indicating the positions of cars traveling in the up direction.

The operation of starting and stopping an elevator car will first be described. The circuits for controlling the starting and stopping of car *a* are shown in Figures 1 and 2. Assume that car *a* is at the lower dispatching terminal, set for up travel with its car and hoistway doors closed, and that its dispatching has been initiated. Under such conditions up direction switch UP*a* is in operated condition, conditioning car *a* for upward travel and up dispatch holding switch WBX*a* is in operated condition. Thus contacts WBX2*a* (Figure 1) are engaged, completing a circuit for the operating coil of starting and slowdown switch SR*a* through manual switch KS2*a* and contacts NT3*a*. Switch SR*a* operates to latch itself in operated condition. In doing so, it engages contacts SR4*a*, short circuiting a portion of resistance RCF*a* in series with generator field winding GF*a*. It also engages contacts SR3*a* which, since the doors are in closed position, complete a circuit through hoistway door switch contacts DCO*a*, car door switch contacts GI*a* and emergency switch ES*a* for the coil of field and brake switch H*a*.

Switch H*a* operates to engage contacts H7*a* and H8*a*. This completes a circuit for the release coil of brake BR*a* to release the brake. It also engages contacts H11*a* and H12*a* and separates contacts H10*a*, thereby energizing the generator field winding GF*a* through contacts UP10*a* and UP11*a*, causing the car to start in the up direction. In addition switch H*a* engages contacts H9*a* (Figure 2), completing a circuit for the coil of time delay switch NT*a*. Switch H*a* also engages contacts H5*a* (Figure 1) to prepare a self holding circuit.

As car *a* starts upward, brush B*a* leaves stationary contact CC1*a*, interrupting the circuit for the coil of stopping switch SS*a*. Switch SS*a* releases, engaging contacts SS1*a* to complete a holding circuit for switch H*a* through contacts H5*a*. Also as car *a* leaves the lower dispatching landing, main landing switch ML*a* is actuated by car movement, closing its contacts ML1*a* and opening its contacts ML2*a* without effect at this time.

Car *a* in traveling upward answers car calls and landing calls. Assume that a passenger entered car *a* at the lower dispatching landing and registered a car call for the 3rd landing. In such a case, tube C3*a* (Figure 1) is in conducting condition, establishing a potential drop across resistor RC3*a*. As car *a* approaches the 3rd landing, brush CPBU*a* engages stationary contact CP3*a*, completing a circuit for the coil of car call pick-up switch XCa, the circuit extending from the left side of resistor RC3*a* by way of stationary contact CP3*a*, brush CPBU*a*,

contacts UP2*a*, coil of switch XCa, rectifier RE1*a* and resistor R1*a* over line B to the right side of resistor RC3*a*. Switch XCa operates to engage contacts XC2*a*, for purposes to be explained. This switch also engages contacts XC1*a*, completing a circuit for the release coil of starting and slowdown switch SR*a* through contacts UP3*a* and thence through brush BU*a* in engagement with stationary contact CC3*a*.

Switch SR*a*, upon releasing, engages contacts SR2*a*. This causes half-wave rectified voltage to be applied to the cathode of tube C3*a*, thereby extinguishing this tube to cancel the car call. The cancelling circuit extends from transformer TF (Figure 2) through rectifier RE and over line AC1 through contacts SR2*a* (Figure 1), XC2*a*, rectifier RE2*a*, contacts UP2*a* and brush CPBU*a* in engagement with stationary contacts CP3*a*. Switch SR*a* also separates contacts SR4*a*, inserting resistor RCF*a* in series with generator field winding GF*a* to effect slowdown of car *a*. This switch also initiates the automatic door opening operation (the circuits not being shown) in a standard manner. It also separates contacts SR3*a*, but without effect, since they are short circuited by contacts H5*a* and SS1*a*.

As car *a* arrives at the 3rd landing, brush B*a* engages stationary contact CC3*a*, completing a circuit for the coil of stopping switch SS*a*. Switch SS*a* operates to separate its contacts SS1*a*, interrupting the circuit for the coil of switch H*a*. Switch H*a* releases to separate contacts H7*a* and H8*a*, causing application of the brake and to separate contacts H11*a* and H12*a* to disconnect generator field winding GF*a* from its supply lines, causing the stopping of the car. Switch H also engages contacts H10*a* to establish a suicide connection for the generator field winding.

Switch H*a* also separates its contacts H9*a* (Figure 2), interrupting the circuit for the coil of switch NT*a*. Switch NT*a* is delayed in releasing, by the discharge of condenser Q through its coil, to establish a predetermined passenger transfer time interval during which passengers may enter or leave the car. After condenser Q has discharged sufficiently, switch NT*a* releases to initiate the automatic door closing operation (the circuits thereof not being shown). It also engages contacts NT3*a* (Figure 1) to complete a circuit for the operating coil of switch SR*a* through main landing switch contacts ML1*a* and top landing switch contacts TL1*a*. Switch SR*a* operates and latches in operated condition, engaging contacts SR3*a* and, as the doors reach closed position, completes a circuit for the coil of switch H*a* through contacts GI*a* and DCO*a* thereby again starting car *a* upward, as has been previously described.

Next assume that as car *a* is traveling upward, an up landing call is registered for the 15th landing. In such a case, tube UH15 (Figure 2) is in conducting condition, establishing a voltage drop across resistor RU15. As car *a* approaches the 15th landing, brush UPB*a* engages stationary contact UH15*a*, completing a circuit for the coil of landing call pick-up switch XS*a*, the circuit extending from the left side of resistor RU15 through stationary contact UH15*a*, brush UPB*a*, contacts UP4*a*, the coil of switch XS*a*, rectifier RE6*a*, contacts NS1*a* and resistor R2*a* to line B. Switch XS*a* operates to engage contacts XS2*a*, preparing the landing call cancelling circuit. Switch XS*a* also engages contacts XS1*a* (Figure 1), completing a circuit through contacts UP3*a* and brush BU*a* in engagement with stationary contacts CC15*a* for the release coil of switch SR*a*. Switch SR*a* releases to engage contacts SR1*a* (Figure 2), thereby applying half-wave rectified voltage from transformer TF over line AC1 through contacts XS2*a* to the cathode of tube UH15 to extinguish the tube and cancel that landing call. Other up traveling cars are thus prevented from responding to that landing call. Switch SR*a* separates contacts SR4*a* (Figure 1) to effect slowdown of the car and initiate the automatic opening of the doors, as it approaches the

15th landing. As car *a* arrives at the 15th landing, brush *Ba* engages stationary contact *CC15a*, completing a circuit for the coil of switch *SSa* to stop the car, as has been previously described.

After the expiration of a passenger transfer time interval, established by condenser *Q* (Figure 2), the doors automatically close and car *a* continues upward. As the car approaches the upper dispatching landing, top landing switch *TLa* is actuated by car movement, closing contacts *TL2a* to complete a circuit for the release coil of Switch *SRa*. This switch releases to effect slowdown of the car. Switch *TLa* also opens contacts *TL1a*, without effect. As the car arrives at the upper dispatching landing, brush *Ba* engages stationary contact *CC17a*, completing a circuit for the coil of switch *SSa*. This switch operates to stop the car, as has been previously described. Also, as the car arrives at the upper dispatching landing, brush *BZa* (Figure 2) engages stationary contact *CTLa*, completing a circuit through contacts *DN6a* and *H6a* for the release coil of switch *UPa* and the operating coil of switch *DNa*, thereby conditioning car *a* for downward travel. The dispatching of the car on its downward trip from the upper dispatching landing will be described later. As the car leaves the landing, top landing switch *TLa* is again actuated by car movement, reclosing contacts *TL1a* (Figure 1) and reopening contacts *TL2a*.

In a similar manner, as the car approaches the lower dispatching landing, main landing switch *MLa* is actuated by car movement to open contacts *ML1a*, but without effect at this time. It also closes contacts *ML2a*, completing a circuit for the release coil of switch *SRa* to initiate slowdown of the car. As brush *Ba* engages stationary contact *CC1a*, a circuit is completed for the coil of switch *SSa* to stop the car. Also, as the car arrives at the lower dispatching landing, brush *BZa* (Figure 2) engages stationary contact *CMLa*, completing a circuit through contacts *UP9a* and *H6a* for the release coil of switch *DNa* and the operating coil of switch *UPa*, thereby conditioning car *a* for upward travel.

It is to be noted that car *a* responds to car calls while traveling downward in the same manner as described for upward travel, brush *CPBDa* picking up the calls instead of brush *CPBUa*. Similarly, landing calls are picked up during downward travel by brush *DPBa* (Figure 2) instead of brush *UPBa*, and the slowdown of the car during downward travel is initiated by means of brush *BDa* (Figure 1) instead of brush *BUa*.

An understanding of the invention can best be gained from a description of the sequences of operations. Assume that for this particular installation the demand for the selected car is measured as follows: one or more car calls registered in the selected car equals 5 demand units, each registered landing call also equals 5 demand units, the predicted demand factor for each landing for each direction of travel is established as 1 demand unit except as follows: the predicted up demand factor for the lower dispatching landing is established as 4 demand units to provide a desirable preference in service to incoming traffic, the predicted down demand factor for the upper dispatching landing is established as 3 demand units to provide a parking preference for that landing, the predicted up demand factor for the 2nd and 3rd landings, each, is established as 2 demand units to give a slight preference to up traffic from these landings, as would be desirable, if for example, a cafeteria for building employees and a mailing room were located at the 2nd and 3rd landings, respectively, no predicted up demand factor is established for the upper dispatching landing, since there are no landings above, no predicted down demand factor is established for the lower dispatching landing, since for simplicity, landings below the dispatching landing are not considered in this example, and the predicted down demand factor for the 15th landing is established as 3 units to give down traffic from that landing preference, as would be desirable, if for example, the tenancy

of that landing comprises a relatively large number of people. As has been previously explained, the aforementioned registered and predicted demands are totalized in demand units by connecting resistors representative of these demands in parallel in the totalizing circuit for the selected car for the direction to which the demands relate.

Next assume that the total registered and predicted demand for dispatching a selected car is established as say 15 demand units for each direction. In other words, with three cars in group operation, adjustable taps *T1* are positioned on resistors *PDUR1* and *PDDR1* so as to prevent each of tubes *PTU* and *PTD* from conducting sufficient current to initiate dispatching of a selected car until the totalized demand to which the selected car for the corresponding direction of dispatching is subject reaches a total of 15 demand units. For each direction of travel, this occurs when the ohmic values of the demand resistors connected in parallel in the totalizing circuit for that direction are such that the resultant resistance provides the desired number of demand units.

Assume that cars *a*, *b* and *c* are at the lower dispatching landing and are set for upward travel. In such a case, as car *a* arrived at the lower dispatching landing traveling downward, brush *BZa* (Figure 2) engaged stationary contact *CMLa* and, upon the engagement of contacts *H6a* during the stopping operation, a circuit was established by way of contacts *UP9a* for the release coil of down direction switch *DNa* and for the operating coil of up direction switch *UPa*. This caused switch *DNa* to be reset and switch *UPa* to operate. Switch *UPa* latched into operated condition thereby setting car *a* for upward travel. Switch *UPa* also separated contacts *UP9a*, interrupting the circuit through its operating coil and the reset coil of switch *DNa*. Similar circuits (not shown) were established for cars *b* and *c*, as they arrived at the lower dispatching landing, thereby conditioning them for upward travel.

Next assume that cars *a*, *b* and *c* are put into group operation in that order by closing manual switches *KS1* to complete the circuits for the coils of car in service switches *CS*, the circuit for the coil of switch *CSa* for car *a* being shown in Figure 2. Switch *CSa* operates to engage contacts *CS4a* (Figure 3), completing a circuit through contacts *NS2a* and *UP5a* and thence through brush *PUBa* in engagement with stationary contact *PUC1a* for the coil of up car position switch *1PIU*. This switch operates to engage contacts *1PIU2* (Figure 6), thereby illuminating lamp *LU1* in the car position indicator panel to indicate that a car is at the lower dispatching landing and is set for upward travel. Switch *1PIUa* also separates contacts *1PIU1* (Figure 4), for purposes to be explained later. It may be noted, that so long as any car of the group is at the lower dispatching landing and is set for upward travel, switch *1PIU* remains in operated condition, maintaining contacts *1PIU1* separated.

Switch *CSa* also engages contacts *CS2a* (Figure 3), completing a circuit through brush *SDBa* in engagement with stationary contact *SDMa* for the coil of available up car switch *VBa*. Similarly, like circuits are completed by means of brush *SDBb* in engagement with stationary contact *SDMb* for car *b*, and brush *SDBc* in engagement with stationary contact *SDMc* for car *c* for the coils of available up car switches *VBb* and *VBc* for cars *b* and *c*, respectively. Switch *VBa* operates to engage contacts *VB2a*, completing a circuit through rotary brush *VURB1* of up notching switch *VUR*, which brush is shown in engagement with stationary contact *VURa*, and through contacts *WBX4a* for the coil of up selected car switch *WBa*. Switch *WBa* operates to separate *WB3a*, preventing energization of the coil of switch *VUR* and thereby maintaining brush *VURB1* in engagement with stationary contact *VURa*. Thus, car *a* is selected as the next car to be dispatched upward.

In the absence of car calls registered in selected car *a* and of landing calls in registration, there is sufficient totalized demand in the system, under the assumed conditions, to cause car *a* to be dispatched upward, as soon as it is selected. Such demand is due solely to the summation of the predicted up demand (previously described) established at the landings and is totalized as follows: a plurality of circuits is established through resistor PDUR1 (Figure 4), one such circuit extending from line B+ through predicted down demand resistor 17PDR, representing the predicted demand from the 17th landing in the down direction, contacts 17PID1 and contacts 16PIU1 through 2PIU1, contacts WBX3a, WBX3b, WBX3c and resistor PDUR1 to line B, similar circuits being completed through resistor PDUR1 from line B+ through predicted up demand resistors 16PUR to and including 2PUR, representing the predicted up demand from the 16th through 2nd landings respectively. Therefore, a total of 16 demand resistors are connected in parallel with each other and in series with resistor PDUR1, providing for the weights in demand units previously assigned in this example to the foregoing predicted demand resistors a total of 20 demand units. Since it has been assumed that adjustable tap T1 is so positioned on resistor PDUR1 that current flowing through this resistor due to 15 demand units is sufficient to dispatch a car, a positive potential is applied to the grid of tube PTU with respect to its cathode of high enough value to cause tube PTU to conduct current through the coil of summation up demand switch PDU of a value to cause this switch to operate.

Switch PDU, upon operation, engages contacts PDU1 in the dispatching circuits of Figure 3. Therefore, as switch WBa operates, selecting car *a* for dispatching, it engages contacts WB2a, completing a circuit for the coil of up dispatch holding switch WBXa, the circuit extending from supply line + through contacts PDU1, WB2a, the coil of switch WBXa, stationary contact SDMa, brush SDBa and contacts CS2a to supply line -. Switch WBXa operates to initiate the automatic door closing operation (not shown) for car *a* and dispatching of the car in the up direction.

Switch WBXa also engages its self holding contacts WBX1a and separates contacts WBX3a (Figure 4), interrupting the current flow through resistor PDUR1, thereby discontinuing the application of grid potential to tube PTU. Tube PTU then conducts insufficient current to maintain switch PDU in operated condition. Switch PDU releases, separating contacts PDU1 (Figure 3) in preparation for subsequent dispatching operations. Switch WBXa also separates contacts WBX4a, interrupting the circuit for the coil of switch WBa. Switch WBa releases to engage contacts WB3a, completing a circuit for the coil of switch VUR, the circuit extending from supply line + through parallel contacts VB1b and VB1c, contacts VUR1, the coil of switch VUR, contacts WB3a, WB3b and WB3c to supply line -. Switch VUR operates to separate contacts VUR1, deenergizing its coil and causing step-by-step counterclockwise rotary movement of its brushes VURB1-3. Brush VURB1 engages stationary contact VURb, completing a circuit for the coil of switch WBb through contacts VB2b and WBX4b thereby transferring selection, as the next car to be dispatched, to car *b*. Switch WBb operates to separate contacts WB3b, preventing other cars from being selected and engages contacts WB2b, preparing the dispatching circuits for car *b*.

Switch WBXa also engages contacts WBX2a (Figure 1), completing a circuit through manual switch KS2a and contacts NT3a for the operating coil of starting and slowdown switch SRa. Switch SRa operates and latches in operated condition. Switch SRa, upon operation, engages contacts SR3a and, as the car and hoistway doors reach closed position, hoistway door switch contacts DCOa and car door switch contacts G1a close, complet-

ing a circuit for the coil of field and brake switch Ha, the circuit extending from supply line + through contacts SR3a, G1a, DCOa, the coil of switch Ha and emergency switch ESa to supply line -. Switch Ha operates to engage its self holding contacts H5a. It also engages contacts H9a (Figure 2), completing a circuit for the coil of time delay switch N1a which operates, without effect at this time. In addition, switch Ha engages contacts H7a and H8a (Figure 1), completing a circuit for brake release coil BRa. It also engages contacts H11a and H12a, and separates contacts H10a, energizing the generator field windings GFa through contacts UP10a and UP11a, causing car *a* to start upward.

As a car starts upward from the lower dispatching landing, brush PUBa (Figure 3) engages stationary contact PUC2a, completing a circuit through contacts UP5a, NS2a and CS4a for the coil of up car position switch 2PIU. Switch 2PIU operates to engage contacts 2PIU2 (Figure 6), thereby illuminating lamp LU2 to indicate that an up traveling car is approaching the 2nd landing. Switch 2PIU also separates contacts 2PIU1 (Figure 4), thereby isolating the registered and predicted demand ahead of car *a* from affecting the up dispatching totalizer. Shortly after brush PUBa (Figure 3) engages stationary contact PUC2a, brush SDBa leaves stationary contact SDMa, interrupting the circuit for the coil of switch WBXa. Switch WBXa releases, engaging contacts WBX3a (Figure 4) to prepare the up totalizer circuits of tube PTU for measuring the registered and predicted demand ahead of selected car *b*.

As car *a* leaves the lower dispatching landing, switch MLa (Figure 1) is actuated by car movement, closing contacts ML1a and opening contacts ML2a, without effect at this time. As car *a* continues moving upward toward the 2nd landing, brush PUBa (Figure 3) leaves stationary contact PUC1a. This is without effect since a circuit through the coil of switch 1PIU is maintained by means of brushes PUBb, PUBc in engagement with their respective stationary contacts PUC1b, PUC1c, indicating that a car set for up travel is still positioned at the lower dispatching landing.

It is believed it will be seen that as car *a* moves upward, brush PUBa (Figure 3) first engages and then moves off of stationary contacts PUC2a through PUC14a in succession, thereby causing switches 2PIU through 14PIU to operate and release in sequence. Switches 2PIU through 14PIU, as they thus operate and then release in sequence, first engage and then separate contacts 2PIU2 through 14PIU2 respectively (Figure 6) thereby sequentially illuminating and then extinguishing lamps LU2 through LU14 to indicate continuously the position of car *a* as it travels upward.

Likewise, switches 2PIU through 14PIU, as they operate and release in sequence, separate and then engage their respective contacts 2PIU1 through 14PIU1 (Figure 4) in sequence. As car *a* leaves the 2nd landing, switch 2PIU releases to reclose contacts 2PIU1, completing a circuit through resistor PDUR1, the circuit extending from line B+ through resistor 2PUR, contacts 2PIU1, WBX3a, WBX3b, WBX3c and resistor PDUR1 to line B. This causes a certain amount of current flow through resistor PDUR1. As car *a* leaves the 3rd landing, switch 3PIU releases to reclose contacts 3PIU1, inserting resistor 3PUR for the 3rd landing in parallel with resistor 2PUR in the up totalizing circuit, thereby increasing the current flow through resistor PDUR1. In a similar manner, as car *a* continues upward, resistors 4PUR through 14PUR (not shown) are each inserted in parallel with resistor 2PUR in the up totalizing circuit, each increasing the current flow through resistor PDUR1. Thus, as car *a* travels upward, the predicted demand behind it and ahead of selected car *b* is totalized by the up dispatching demand totalizer, for dispatching selected car *b*.

As car *a* leaves the 14th landing and contacts 14PIU1 (not shown) release to insert resistor 14PUR (not shown) in the aforementioned up demand totalizing circuit, the

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ohmic values of the predicted demand resistors connected in parallel provide a total of 15 demand units. Thus the current through resistor PDUR1 is increased to a sufficient amount to cause switch PDU to operate. Switch PDU, upon operation, engages contacts PDU1 (Figure 3), initiating dispatching of selected car *b* and transferring selection from car *b* to car *c*, as was previously described for the up dispatch of car *a* and transfer of selection from car *a* to car *b*.

Under the assumed conditions, sufficient demand also exists in the down direction to dispatch a car downward as soon as it becomes selected for down dispatching. This down demand is likewise due solely to the predicted demand from the landings and is totalized by the down dispatching demand totalizer, as follows: car *c*, positioned at the lower dispatching landing and set for upward travel, maintains contacts 1PIU1 (Figure 4) separated, as has been previously stated, preventing registered and predicted demand at the lower dispatching landing from affecting the down dispatching demand totalizer. However, since no cars are presently traveling downward, a plurality of circuits is completed through resistor PDDR1 in the down dispatching demand totalizer circuits, one such circuit extending from line B+ through predicted down demand resistor 2PDR, contacts 2PID1 to and including 16PID1, contacts WTX1a, WTX1b, WTX1c and resistor PDDR1 to line B, thereby causing a certain amount of current flow through resistor PDDR1. Similar circuits are completed through resistor PDDR1 from line B+ through resistors 3PDR to and including resistor 16PDR for the 3rd to 16th landings, respectively. Thus predicted down demand resistors of ohmic values to provide a total of 17 units of down demand are connected in parallel with each other and in series with resistor PDDR1. This causes sufficient voltage to be applied to the grid of tube PTD with respect to its cathode to cause it to conduct sufficient current through the coil of summation down demand switch PDD to cause this switch to operate and to maintain it in operated condition. Switch PDD, upon operation, engages contacts PDD1 (Figure 3), preparing the down dispatching circuits to dispatch a car which becomes selected for down dispatching. It also separates contacts PDD2 (Figure 1) in the highest car call circuits. As will be explained below, this allows an up traveling car to be selected below the upper dispatching landing.

The voltage applied across the anode-cathode circuit of gas diode tube TV is of sufficient magnitude to cause it to ionize and conduct, completing a circuit through resistor RTV. A potential drop is thus established across that resistor, which potential is applied across the coil of highest car call switch HCCa, maintaining it in operated condition. The coil circuit, for the car positioned at the lower dispatching landing, extends from the left side of resistor RTV through rectifier RWa, contacts PHC1a, rectifier RXa, rectifiers RCB14a through RCB5a (not shown), rectifiers RCB4a through RCB2a, stationary contact CB1a, brush BCBa, contacts UP12a, resistor RHCa, the coil of switch HCCa and over line B to the right side of resistor RTV. As car *a* travels upward, switch HCCa is maintained in operated condition by means of brush BCBa sequentially engaging stationary contacts CB2a through CB14a, until car *a* enters a "top selection zone" located above the 14th landing, the brush before running off a contact engaging the contact ahead. As car *a* enters the "top selection zone," brush BCBa rides off of stationary contact CB14a (not shown) for the 14th landing, interrupting the circuit through the coil of switch HCCa. The circuit is not maintained through contacts CB15a since contacts PDD2a are separated, as has been stated previously. Switch HCCa releases to engage contacts HCC2a (Figure 2), for purposes to be explained later.

Switch HCCa also engages contacts HCC1a (Figure 3), completing a circuit for the coil of available down car switch VTa, the circuit extending from supply line

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+ through the coil of switch VTa, contacts UP1a, HJU1a, HJD1a, HCC1a, PHC2a and CS2a to supply line —. Switch VTa operates to engage contacts VT2a, completing a circuit through parallel contacts NT2a and WTX3a and stationary contact VDRa engaged by brush VDRB1 for the coil of down selected car switch WTa, thereby selecting up traveling car *a* as the next car to be dispatched downward. Switch WTa operates to separate contacts WT3a, preventing energization of down notching switch VDRa and selection of any other car for dispatching downward.

Switch WTa also engages contacts WT1a, completing a circuit for the coil of auxiliary down selected car switch WTXa, the circuit extending from supply line + through contacts PDD1, WT1a, the coil of switch WTXa, contacts UP1a, HJU1a, HJD1a, HCC1a, PHC2a and CS2a to supply line —. Switch WTXa operates to engage its self holding contacts WTX2a. This switch also separates contacts WTX3a, without effect, since they are presently short circuited by contacts NT2a which maintain the selection of car *a*, as the next car to be dispatched downward. Switch WTXa also engages contacts WTX4a (Figure 1), without effect, since they are short circuited by top landing switch contacts TL1a and main landing switch contacts ML1a and since contacts NT3a are presently separated. Contacts WTX1a (Figure 4) also separate, interrupting the current flow through resistor PDDR1, thereby removing the positive potential on the grid of tube PTD which then conducts insufficient current through the coil of switch PDD to maintain it in operated condition. Switch PDD releases, separating contacts PDD1 (Figure 3) and engaging contacts PDD2a (Figure 1), thereby preventing selection of another up traveling car below the upper dispatching landing.

Down selected car switch WTa, upon operating, also engages contacts WT4a (Figure 2), completing a circuit for the coil of car reversal switch XHa to initiate the stopping and reversal of car *a*, as will be explained, the circuit extending through contacts HCC2a, HJU2a and HJD2a. Switch XHa operates to engage contacts XH2a, completing a self holding circuit through contacts UP8a. Switch XHa, upon operation, also engages contacts XH2'a (Figure 3), short circuiting contacts HJU1a, HJD1a and HCC1a, thereby preventing demand above from affecting the selection of car *a* once the reversal operation is initiated, as will be explained later. In addition, this switch engages contacts XH1a (Figure 1), completing a circuit for the release coil of switch SRa, as car *a* approaches the 15th landing, the circuit extending from supply line + through the release coil of switch SRa, contacts XH1a and UP3a and brush BUa in engagement with stationary contact CC15a, to supply line —. Switch SRa releases, separating contacts SR4a, thereby inserting resistance in series with generator field winding GFa to decelerate car *a*. Switch SRa also separates contacts SR3a, without effect, since they are short circuited by contacts H5a and SS1a. As car *a* arrives at the 15th landing, brush Ba engages stationary contact CC15a, completing a circuit for the coil of stopping switch Ssa which operates, separating contacts SS1a to interrupt the circuit for the coil of switch Ha. Switch Ha releases to separate contacts H7a and H8a, causing application of the brake, and separates contacts H11a and H12a and engages contacts H10a, deenergizing generator field winding GFa to stop the car at the 15th landing.

Switch Ha also engages contacts H3a and H6a (Figure 2), completing a circuit through contacts DN6a for the release coil of up direction switch UPa and the operating coil of down direction switch DNa. Switch UPa releases and switch DNa operates, latching into operated condition to condition car *a* for downward travel. Switch UPa also engages contacts UP9a, without effect at this time, and switch DNa also separates contacts DN6a, interrupting the current flow through the release coil of switch UPa and the operating coil of switch DNa.

Switch UP_a, upon releasing, also separates contact UP1_a (Figure 3), interrupting the circuits through the coils of switches VT_a and WTX_a, which release. Switch VT_a, upon releasing, separates contacts VT2_a, interrupting the circuit through the coil of switch WT_a. Switch WT_a releases to engage contacts WT3_a, preparing the selecting circuits for selecting the next car to become available for downward dispatching. Switch WTX_a, upon releasing, engages contacts WTX1_a (Figure 4), preparing the down dispatching demand totalizer circuits for controlling down dispatching of such next selected car.

Switch H_a also separates contacts H9_a (Figure 2), interrupting the circuit through the coil of time delay switch NT_a, which switch is delayed in releasing. After a time delay, switch NT_a releases, engaging contacts NT3_a (Figure 1) to complete a circuit through manual switch KS2_a, top landing switch contacts TL1_a and main landing switch contacts ML1_a for the operating coil of switch SR_a. Switch SR_a operates to engage contacts SR3_a, completing a circuit for the coil of switch H_a. Switch H_a operates to engage contacts H7_a and H8_a, releasing the brake, separates contacts H10_a, and engages contacts H11_a and H12_a to energize the generator field winding, starting car *a* downward. As car *a* starts downward from the 15th landing, brush B_a rides off stationary contact CC15_a, interrupting the circuit for the coil of switch SS_a. Switch SS_a releases to engage contacts SS1_a, completing a holding circuit through contacts H5_a for the coil of switch H_a. Switch H_a also engages contacts H9_a (Figure 2), completing a circuit for the coil of switch NT_a which operates, without effect at this time.

It may be noted that, as car *a* arrives at the 15th landing while traveling upward, brush PUB_a (Figure 3) engages stationary contact PUC15_a, completing a circuit for the coil of switch 15PIU which operates to separate contacts 15PIU1 (Figure 4) in the up dispatching demand totalizer circuit. Switch 15PIU also engages contacts 15PIU2 (Figure 6), causing position indicator lamp LU15 to illuminate to indicate that an up car is approaching the 15th landing. As car *a* stops and reverses its direction of travel from up to down at the 15th landing, contacts UP5_a (Figure 3) separate, interrupting the circuit for the coil of switch 15PIU and contacts DN4_a engage, completing a circuit for the coil of switch 15PID by means of brush PDB_a in engagement with stationary contact PDC15_a. Switch 15PIU releases to separate contacts 15PIU2 in the position indicator circuits of Figure 6, thereby extinguishing lamp LU15. This switch also engages contacts 15PIU1 (Figure 4) in the up dispatching demand totalizer circuits. Switch 15PID operates to engage contacts 15PID2 (Figure 6), completing a circuit for lamp LD15 which illuminates to indicate that a car is at the 15th landing and now is set for downward travel. This switch also separates contacts 15PID1 (Figure 4), interrupting the down dispatching demand totalizer chain to render ineffective demand resistors for landings below the 15th. This prevents another selected car from being dispatched downward.

Therefore, with sufficient down demand to dispatch a car downward from the upper dispatching landing existing in the system and in the absence of an available car at that landing, an up traveling car travels to a "top selection zone" located above the 14th landing and, in the absence of car calls and landing calls above, reverses at and is dispatched downward from the 15th landing. In so doing, it erases the down demand below it from affecting the down dispatching demand totalizer.

In a manner similar to that previously described for dispatching car *b* upward, car *c*, which is selected for dispatching upward from the lower dispatching landing, is dispatched upward when the totalized demand for it reaches 15 demand units. In the absence of car calls registered in car *c* and registered hall calls, this occurs when next preceding car *b* leaves the 14th landing, traveling upward. As car *b* leaves the 14th landing, as was

previously described, predicted up demand resistors 2PUR through 14PUR are connected in parallel from line B+ through contacts WBX3_a, WBX3_b and WBX3_c and resistor PDUR1 to line B totalizing 15 up demand units for selected car *c*. Thus the current flow through resistor PDUR1 is of sufficient amount to initiate dispatching of selected car *c* upward.

Assume now that car *a* has traveled downward to the 10th landing. Under such conditions brush PDB_a (Figure 3) is in engagement with stationary contact PDC10_a (not shown), completing a circuit through contacts DN4_a, NS2_a and CS4_a for the coil of switch 10PID. Switch 10PID operates to separate contacts 10PID1 (not shown), interrupting the down dispatching demand totalizer chain of Figure 4 to maintain ineffective the demand resistors for landings below the 11th. However, the demand resistors for the 11th landing and above are now effective in the down totalizing circuit. Thus a plurality of circuits from line B+ through predicted down demand resistors 11PDR through 16PDR is completed through resistor PDDR1 of the down dispatching demand totalizer, thereby totalizing 8 demand units in the down direction.

Under such conditions there is insufficient down demand existing to cause tube PTD to conduct enough current to operate switch PDD and effect selection of up traveling car *b* for down dispatching, as it enters the top selection zone. Thus car *b* is not reversed and dispatched downward below the upper dispatching landing, as was previously described for car *a*, but continues traveling upward to the upper dispatching landing, where it is brought to a stop and becomes conditioned for downward travel, in the manner earlier described for car *a* arriving at the upper dispatching landing.

As car *b* arrives at the upper dispatching landing, brush SDB_b (Figure 3) engages stationary contact SDT_b, completing a circuit through contacts CS2_b for the coil of available down car switch VT_b. Switch VT_b operates to engage contacts VT2_b, preparing a circuit for the coil of down selected car switch WT_b. Switch VT_b also engages contacts VT1_b, completing a circuit through contacts VDR1, WT3_a, WT3_b and WT3_c for the coil of down notching switch VDR. Deenergizing of switch VDR by means of its contacts VDR1 causes counterclockwise rotary movement of brushes VDRB1 to VDRB3. As brush VDRB1 engages stationary contact VDR_b, a circuit through contacts VT2_b and parallel contacts NT2_b and WTX3_b is completed for the coil of switch WT_b. Switch WT_b operates, separating contacts WT3_b, to prevent further energization of switch VDR, limiting selection to car *b* as the next car to be dispatched from the upper dispatching landing. Switch WT_b also engages contacts WT1_b, preparing a circuit for the coil of auxiliary down selected car switch WTX_b, so that selected car *b* will be dispatched downward as soon as sufficient down demand exists for it and provided that the passenger transfer interval provided by switch NT_b (not shown) has expired.

Next assume that the passenger transfer interval has expired. In such a case, switch NT_b (not shown) releases to separate contacts NT2_b, without effect at this time, and to engage contacts NT3_b (not shown) preparing the starting circuit of car *b*.

As car *a* continues traveling downward, the predicted down demand resistors PDR for the landings behind it are connected in parallel in the down dispatching demand totalizer circuits of Figure 4. As car *a* leaves the 4th landing, brush PDB_a (Figure 3) rides off of stationary contact PDC4_a (not shown), interrupting the circuit for the coil of switch 4PID (not shown). Switch 4PID releases to engage contacts 4PID1 (not shown), inserting predicted down demand resistor 4PDR (not shown) in the down dispatching demand totalizer circuits of Figure 4 in parallel with predicted down demand resistors 5PDR through 16PDR. Therefore, as car *a* leaves the 4th land-

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ing, a total of 13 such parallel circuits is completed through resistor PDDR1, the circuits extending from line B+ through predicted down demand resistors 4PDR through 16PDR, connected in parallel and through contacts WTX1a, WTX1b, WTX1c and resistor PDDR1 to line B. For the weights in demand units previously assumed for the foregoing predicted down demand resistors, a total of 15 down demand units is thus totalized. This causes enough current to flow through resistor PDDR1 to cause tube PTD to conduct sufficient current to operate summation down demand switch PDD. Switch PDD, upon operation, engages contacts PDD1 (Figure 3), completing a circuit for the coil of switch WTXb, the circuit extending from supply line + through contacts PDD1 and WT1b, the coil of switch WTXb, stationary contact SDTb in engagement with brush SDBb, and contacts CS2b to supply line -. Switch WTXb operates to engage its self holding contacts WTX2b. Switch WTXb also separates contacts WTX3b, interrupting the circuit of switch WTB which releases, allowing another car to be selected for down dispatching when available. It also engages contacts WTX4b (not shown) in the starting circuit of car b, thereby completing a circuit through contacts NT3b (not shown) for the operating coil of starting and slowdown switch SRb (not shown) to start car b downward in a similar manner to that previously described for car a.

Next assume that car b is positioned at the upper dispatching landing, selected as the next car to be dispatched downward, that car a is traveling downward past the 14th landing, and that a down landing call for the 15th landing is registered behind next preceding car a. Under such conditions tube DH15 (Figure 2) conducts, establishing a voltage drop across resistor RD15. A circuit is thus completed from the left side of resistor RD15 over cross-connecting wire WD15 through rectifier RWD15 (Figure 4), landing call demand resistor 15RDR, contacts 15PID1, 16PID1, WTX1a, WTX1b and WTX1c, resistor PDDR1 and over line B to the right side of resistor RD15 (Figure 2). In this manner 5 units of registered down demand (the weight previously given as representing a registered landing call) are added to the totalized predicted down demand units behind next preceding car a. Under such conditions, as car a leaves the 9th landing traveling downward, predicted down demand resistor 9PDR (not shown) is inserted in the down dispatching demand totalizer circuits of Figure 4, increasing the total down demand units behind next preceding car a to 15, 10 of which are due to the predicted down demand behind it and the remaining 5 of which are due to the down landing call registered at the 15th landing. Therefore with 15 down demand units totalized for selected car b, it is dispatched downward, as next preceding car a leaves the 9th landing traveling downward, instead of waiting until car a travels past the 4th landing, as was described in the previous example.

Next assume that instead of a down landing call being registered behind down traveling car a, as it travels past the 14th landing, one or more car calls are registered in selected car b, as it is positioned at the upper dispatching landing. In such a case, 5 units of down demand (the weight previously given as representing the registration of one or more car calls in the selected car) are added to the predicted down demand totalized behind next preceding car a, causing selected car b to be dispatched downward, as next preceding car a leaves the 9th landing. Assume that the car call registered in selected car b is for the 3rd landing. This completes a circuit from the car call registering circuits of car b (not shown) over cross-connecting wire WC3b (Figure 5) through rectifier RET3b, the coil of down selected car, call switch CKTb and contacts WT2b of the down selected car switch. Switch CKTb operates to engage contacts CKT1b (Figure 4), completing a circuit through down demand totalizer resistor PDDR1, the circuit extending

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from line B+ through contacts CKT1b, resistor RCKb, contacts WTX1a, WTX1b and WTX1c and resistor PDDR1 to line B. Therefore, as next preceding car a leaves the 9th landing, traveling downward, a total of 15 down demand units, 5 due to the car call registered in selected car b and the other 10 due to predicted down demand behind car a, are totalized for selected car b, causing it to be dispatched downward, as was previously described.

By observation of the circuits of Figures 4 and 5, it will be seen that the registration of more than one car call in the selected car has the same effect as the registration of only one car call. Thus, with two or more car calls registered in the selected car, only 5 units of registered demand are added to the totalized predicted demand utilized to dispatch the selected car. In this manner passengers are prevented from interfering unduly with the dispatching of a selected car by registering "false" car call demand.

Next assume the registration of a car call in selected car b, as it awaits down dispatching, in addition to the registration of a down landing call at the 15th landing behind down traveling car a. In such a case, 10 units of registered down demand, 5 for the car call and 5 for the landing call, are totalized with the predicted down demand behind the next preceding car a. Under such circumstances, selected car b is dispatched downward as next preceding car a leaves the 14th landing. Such is also the case, if it is assumed instead that two down landing calls, one for the 16th and one for the 15th landings, are registered behind down traveling car a.

Next assume that, under conditions where a car call is in registration for selected car b, the realization of a totalized service demand for dispatching car b is delayed, say due to the number of stops being made by next preceding car a on its downward trip. This car call, as previously pointed out, causes operation of switch CKTb. Thus contacts CKT2b are engaged, completing a circuit for the coil of car call time switch ZKb, the circuit extending from line B+ through contacts CKT2b, the coil of switch ZKb and resistor RZKb to line B. Switch ZKb is delayed in operating by the time required for condenser QZKb, connected in parallel with its coil, to charge to a sufficient potential to cause its operation. When switch ZKb operates, it engages contacts ZK1b (Figure 3), completing a circuit for the coil of switch WTXb, the circuit extending from supply line + through contacts ZK1b, the coil of switch WTXb, stationary contact SDTb in engagement with brush SDBb and contacts CS2b to supply line -. Thus, if the car call is registered long enough for the delayed operation of switch ZKb to occur before there is sufficient totalized registered and predicted demand to dispatch car b, the operation of switch WTXb in response to such car call causes the dispatch of the car to take place without waiting on sufficient totalized demand to arise.

As has been previously pointed out, a next preceding car, traveling in a given direction, interrupts the totalizer chain for that direction to render the registered and predicted demand for landings ahead of it ineffective for affecting the dispatching of a selected car at the dispatching landing behind it. For example, assume that car b is at the proper dispatching landing, selected for down dispatching and next preceding car a is at say the 10th landing, traveling downward. Under such conditions, brush PDBa (Figure 3) is in engagement with stationary contact PDC10a (not shown), completing a circuit for the coil of switch 10PID (not shown). Switch 10PID is in operated condition, maintaining contacts 10PID1 (not shown) separated to interrupt the down dispatching demand totalizer chain in the circuits of Figure 4, thereby rendering registered and predicted down demand for landings below the 11th ineffective for affecting the down dispatching of selected car b. Thus, assuming that a down landing call for the 3rd landing is

registered, it is not included in the totalized demand for dispatching car *b* and only 8 units of predicted down demand are totalized, an amount insufficient to effect dispatching.

Next assume that next preceding car *a* becomes loaded at the 10th landing, to say 80% of capacity, to cause load switch *LSa* (Figure 2) to close, thereby completing a circuit for the coil of nonstop switch *NSa*. Switch *NSa* operates to separate contacts *NS1a*, rendering ineffective the landing call pick-up circuits of car *a* which thereafter bypasses landing calls. Switch *NSa* also separates contacts *NS2a* (Figure 3), interrupting the circuit for the coil of switch *10PID* (not shown). Switch *10PID* releases to engage contacts *10PID1* (not shown) in the totalizer chain of Figure 4, thereby adding the registered and predicted down demand ahead of bypassing car *a* to the 9 units of predicted down demand totalized behind it. Therefore, with next preceding car *a* bypassing landing calls, more than 15 down demand units are totalized for selected car *b*, causing it to be dispatched downward, as has been previously described.

In a similar manner, contacts *NS2* (Figure 3) are effective to cause the predicted and registered up demand ahead of an uptraveling next preceding car which is bypassing up landing calls to be added to the up demand behind it for dispatching a selected car from the lower dispatching landing.

Therefore, it is seen that a selected car is dispatched when the total demand to which it is subject becomes, or exceeds, the assumed 15 demand units of registered demand or predicted demand or any combination of them and, that under conditions where the next preceding car is bypassing landing calls, the registered demand and predicted demand ahead of that next preceding car and behind the next, next preceding car are included in such total demand for dispatching the selected car.

Next assume that car *c* is at the lower dispatching landing and has been selected as the next car to be dispatched upward, while car *a*, the car previously dispatched upward, has traveled to the 10th landing. Further assume that car *b* is traveling downward and sufficient down demand is totalized behind it to cause switch *PDD* to operate, thereby preparing the selecting and dispatching circuits for reversing up traveling car *a* below the upper dispatching landing and dispatching it downward, as has been previously described. Under such conditions, as was pointed out previously, switch *HCCa* (Figure 1) is maintained in operated condition by means of the voltage applied across its coil by the engagement of contacts *PHC1a* until car *a* travels upward past the 14th landing to enter the top selection zone. Thus, switch *HCCa* prevents car *a* from reversing below the 15th landing.

Next assume that a passenger enters next preceding car *a* at the 10th landing and registers a car call for the 16th landing. Under such conditions, tube *C16a* conducts, establishing a voltage drop across resistor *RC16a*, thereby completing another circuit through brush *BCBa* in engagement with stationary contact *CB10a* (not shown) for the coil of highest car call switch *HCCa*. Thus, as car *a* travels upward, switch *HCCa* is maintained in operated condition by means of brush *BCBa* in engagement with stationary contacts *CB11a* to *CB16a* until the car call at the 16th landing is answered, thereby preventing the reversal of car *a* as it enters the top selection zone. As the stopping of car *a* at the 16th landing is initiated, canceling the car call, switch *HCCa* releases, engaging contacts *HCC1a* (Figure 3) and *HCC2a* (Figure 2), thereby causing car *a* to reverse and be dispatched downward, as has been previously described, at the landing of its highest call in the top selection zone.

Next assume that instead of a car call being registered in car *a* for the 16th landing, a down landing call is registered by an intending passenger at the 16th landing. Under such conditions, tube *DH16* conducts, es-

tablishing a voltage drop across cathode resistor *RD16*, which voltage is applied across the coil of highest down landing call switch *HJDa*, the circuit extending from the left side of resistor *RD16* through rectifiers *RED16*, *REH15* to and including *REH10*, stationary contact *DHH10a* in engagement with brush *BDHHa*, rectifier *REHJa*, contacts *UP14a*, resistor *RJD*, the coil of switch *HJDa* and over line *B* to the right side of resistor *RD16*. Switch *HJDa* operates and is maintained in operated condition by means of brush *BDHHa* engaging stationary contacts *DHH11a* to *DHH15a*, as car *a* travels upward to the 16th landing to answer that down landing call. Switch *HJDa*, upon operation, separates contacts *HJD1a* (Figure 3) and *HJD2a* (Figure 2), preventing up traveling car *a* from being selected for down dispatching, as it enters the top selection zone.

As car *a* approaches the 16th landing, brush *BDHHa* rides off of stationary contact *DHH15a*, interrupting the circuit through the coil of highest down landing call switch *HJDa*. Switch *HJDa* releases to engage contacts *HJD1a* (Figure 3), completing a circuit for switch *VTa*, thereby causing car *a* to be selected for down dispatching from the 16th landing, as was previously described. The latter circuit extends from supply line + through the coil of switch *VTa*, contacts *UP1a*, *HJU1a*, *HJD1a*, *HCC1a*, *PHC2a* and *CS2a* to supply line -. Switch *HJDa* also engages contacts *HJD2a* (Figure 2) to prepare the car reversal circuit for car *a*. As car *a* becomes so selected, switch *WTa* (Figure 3) operates, engaging contacts *WT4a* (Figure 2), thereby completing a circuit for the coil of car reversal switch *XHa* through contacts *HCC2a*, *HJU2a* and *HJD2a*. Switch *XHa* operates to engage contacts *XH1'a*, rendering brush *DPBa* effective to pick up and cancel the down landing call at the 16th landing, as the car approaches that landing. In addition switch *XHa*, upon operation, initiates the stopping of car *a* at the 16th landing and the conditioning of it for downward travel, as has been previously described. As has been previously described, at the expiration of the passenger transfer time interval car *a* is started downward.

Next assume that instead of a down landing call being registered at the 16th landing, an up landing call is registered. In such a case, tube *UH16* conducts, completing a similar circuit for the coil of highest up landing call switch *HJUa* (Figure 2). Switch *HJUa* operates and is maintained in operated condition by means of brush *BUHHa* in engagement with stationary contacts *UHH11a* to *UHH15a*, as car *a* travels towards the 16th landing to answer the up landing call at that landing. Switch *HJUa*, upon operation, separates contacts *HJU1a* (Figure 3) and *HJU2a* (Figure 2), thereby preventing car *a* from being selected for down dispatching, as it enters the top selection zone.

As car *a* answers the up landing call at the 16th landing and cancels that call, the circuit through the coil of highest up landing call switch *HJUa* is interrupted. Switch *HJUa* is delayed in releasing for a certain time, illustrated for convenience as provided by the discharge of condenser *QJUa* into its coil. Condenser *QJUa* is selected so as to maintain switch *HJUa* in operated condition until the expiration of a relatively short time after the doors have opened at the landing stop. In this manner entering passengers may register car calls for landings above, causing the car to continue upward. For example, assume that an entering passenger registers a car call for the 17th landing. In such a case tube *C17a* (Figure 1) conducts, causing switch *HCCa* to operate. Switch *HCCa*, upon operation, separates contacts *HCC1a* (Figure 3) and *HCC2a* (Figure 2), thereby preventing reversal of car *a* and selection of car *a* for down dispatching, as has been previously described. Thus, at the expiration of the passenger transfer time, car *a* continues upward from the 16th landing.

Next assume that such a car call for a landing above is not registered by an entering passenger at the 16th

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landing. In such a case, after condenser QJUa has discharged sufficiently, switch HJUa releases to engage contacts HJU1a (Figure 3) and HJU2a (Figure 2), causing car *a* to be selected, reverse its direction of travel to down and be dispatched downward, as has been described.

It may be noted that, in the foregoing example, car *c* which is selected for dispatching from the lower dispatching landing is dispatched upward, as car *a* in traveling upward leaves the 14th landing, since 15 units of predicted up demand are then totalized behind next preceding car *a*, as has been described. It may also be noted that, in the previous example, if a car call is registered in selected car *c*, as it waits to be dispatched upward, or an up landing call is registered behind next preceding car *a*, say for the 6th landing, car *c* is dispatched as car *a* in traveling upward leaves the 9th landing instead of waiting until car *a* leaves the 14th landing.

A car call which has been registered for a certain time in a selected car at the lower dispatching landing causes the car to be dispatched, regardless of the amount of up demand totalized for it, in the same manner as has been previously described for a long wait car call in a selected car at the upper dispatching landing. For example, assume that car *a* is selected for dispatching upward and a car call is registered therein. In such a case, up selected car, car call switch CKBa (Figure 5) operates, engaging contacts CKB1a to complete a circuit for the coil of switch ZKa, which is delayed in operating for a certain time interval, as has been stated previously. At the expiration of that time interval, switch ZKa operates to engage contacts ZK2a (Figure 3), causing operation of switch WBXa and thus causing the car to be dispatched, as has been previously described.

Assume now that selected car *a* while awaiting dispatch becomes loaded to the previously assumed 50% of capacity. Under such conditions, load dispatch switch LDSa closes, completing a circuit through contacts NT1a and WB1a, which are presently engaged, for the coil of up selected car load switch LDWa. Switch LDWa operates to engage contacts LDW1a (Figure 3), completing a circuit through brush SDBa in engagement with stationary contact SDMa and through contacts CS2a for the coil of switch WBXa. Switch WBXa operates to cause selected car *a* to be dispatched upward, as previously described, even though sufficient registered and predicted demand to dispatch it does not exist.

Therefore, it is seen that a car, selected as the next car to be dispatched from the lower dispatching landing, is immediately dispatched, under conditions where a car call is registered in it for a certain period or upon it becoming loaded to a certain percentage of its capacity, 50% in this case, regardless of the amount of up registered and predicted demand totalized for it.

Under certain conditions of operation a selected car at the lower dispatching landing may be conditioned to reverse at its highest call, an operation which may be termed "preordained reversal." Such operation is had under conditions where the car is dispatched on its upward trip before the totalized demand conditions arise and all previously registered landing calls have been canceled for at least a certain length of time, or if registered subsequent to the expiration of that certain time, have not been in registration for a predetermined time. This advance dispatch may be due to a car call having been in registration in the selected car for a certain period or to a car becoming loaded to a certain percentage of capacity, as above set forth.

To illustrate preordained reversal operation, assume first that a long wait car call for the 3rd landing has caused operation of switch ZKa to advance dispatch selected car *a*, as has been previously described. Assume also that all previously existing landing calls have been canceled for at least a certain time which, as will be set forth below, causes switch BLT to be released. Under

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such conditions, contacts ZK3a and BLT1a (Figure 5) are engaged, completing a circuit through contacts UP6a for the coil of preordained reversal switch PHCa. Switch PHCa operates to engage its self holding contacts PHC3a. It also engages contacts PHC4a (Figure 2), preparing a circuit for the coil of car reversal switch XHa. In addition, it separates contacts PHC1a (Figure 1), interrupting the circuit, previously traced, from the left side of resistor RTV through the coil of switch HCCa. However, switch HCCa is maintained in operated condition by the car call for the 3rd landing, previously assumed registered in selected car *a*. As selector car *a* is advanced dispatched upward, it is conditioned to reverse at the landing of its highest call and then return to the lower dispatching landing, as will be explained below.

Car *a* travels upward to the 3rd landing, answers and cancels the car call, causing tube C3a to become extinguished, as was previously described. As tube C3a is extinguished, the potential established across the coil of switch HCCa is removed, causing switch HCCa to release. This switch, upon releasing, engages contacts HCC2a (Figure 2) to complete a circuit through contacts PHC4a, HJU2a and HJD2a for the coil of switch XHa, causing car *a* to be set for downward travel and start back toward the lower dispatching landing, as was previously described. It may be noted, that a later registered landing call for a landing located above the position of car *a*, as it is traveling upward, causes switches HJUa or HJDa to operate, depending upon whether it is an up landing call or down landing call, as has been described. In such case, contacts HJU2a or HJD2a separate, preventing the operation of switch XHa and the reversal of car *a*, until this landing call is answered. However, once switch XHa operates to initiate the reversal operation, it engages contacts XH2'a (Figure 3), preventing car *a* from responding to later registered calls above, as has been previously stated.

As has been stated, this preordained reversal operation also takes place, if selected car *a* at the lower dispatching landing is advanced dispatched due to it becoming loaded to a certain percentage of capacity, and the previously assumed landing call and totalized demand conditions exist. In such a case, switch LDWa (Figure 5) operates to cause the car to be advanced dispatched, as has been described previously. Switch LDWa, upon operation, also engages contacts LDW2a, completing a circuit through contacts UP6a and BLT1a for the coil of switch PHCa. Switch PHCa operates to engage its self holding contacts PHC3a and conditions selected car *a* to reverse at its highest call, as has already been described.

As has been stated, a car which is advanced dispatched upward is conditioned, upon being dispatched, to reverse at its highest call only under conditions where all previously existing landing calls have been canceled for at least a certain time and if landing calls are registered after the expiration of that certain time, the latter have not been in registration for a predetermined time before the advanced dispatching is initiated. In order to see the limiting effect of the registration of a landing call upon the advanced dispatching of a car, assume that prior to the car being advanced dispatched, a down landing call is registered for the 15th landing. Under such conditions, tube DH15 (Figure 2) is in conducting condition, establishing a potential drop across cathode resistor RD15. A circuit is thus established from the left side of resistor RD15 through rectifier RED15, resistor RLD, the coil of down landing call switch BLD and over line B to the right side of resistor RD15. Switch BLD operates to engage contacts BLD1 (Figure 5), completing a circuit for landing call time switch BLT. Switch BLT is delayed in operating and also in releasing for respective predetermined times by the provision of a series circuit comprising condenser QBL, resistor RBL, connected across its coil and by resistor RLT in series with its coil.

After a certain time delay, switch BLT operates to separate contacts BLT1a, rendering switch PHCa ineffective for conditioning car *a* to reverse at its highest call.

Next assume that the call registered at the 15th landing is answered, causing tube DH15 (Figure 2) to be extinguished, thereby removing the potential drop across resistor RD15 and causing switch BLD to release. Switch BLD, upon releasing, separates contacts BLD1 (Figure 5), interrupting the circuit for the coil of switch BLT. Switch BLT is delayed in releasing by the discharge of condenser QBL through its coil. After a certain time interval, provided that no other up or down landing calls are registered, switch BLT releases, indicating that all previously registered landing calls have been answered for at least that certain time. Switch BLT, upon releasing, engages contacts BLT1a, thereby preparing a circuit for the coil of preordained highest call reversal switch PHCa. It may be noted that switch BLT is similarly responsive to up landing calls. This is accomplished by means of contacts BLU1 of up landing call switch BLU (Figure 2), which switch operates upon the registration of an up landing call and releases upon the cancellation of all up landing calls, in a manner similar to that described for switch BLD for down landing calls.

Now assume that an up landing call or down landing call is registered subsequent to switch BLT releasing, thereby causing either contacts BLD1 or BLU1 to engage and complete a circuit for the coil of switch BLT. Switch BLT is delayed in reoperating for a predetermined period, as was previously stated. Therefore, under the assumed conditions, all landing calls, up or down, have been answered for at least a certain period and a later registered landing call, up or down, has not been registered for at least a predetermined period. In such a case, upon car *a* being advanced dispatched upward, switch PHCa operates to condition the car to reverse at its highest call, as has been described. This switch, upon operation, also engages its self holding contacts PHC3a which short circuit contacts BLT1a, thereby rendering subsequent operation of switch BLT due to later registered landing calls ineffective.

It is thus seen that, if no landing calls are in registration for a predetermined time, a selected car at the lower dispatching landing becomes loaded to say, 50% of its capacity or has a car call in registration for a predetermined period and later registered landing calls have not been registered for at least a predetermined period, the selected car is advanced dispatched upward, preordained to reverse at the landing of its highest call and then return to the lower dispatching landing. If landing calls are already in registration for at least a predetermined period or if all previously existing landing calls have not been answered for at least a predetermined period before that car becomes loaded to the assumed 50% of capacity or before a car call has been registered in it for a predetermined period, the selected car is advanced dispatched upward without being conditioned to reverse at the landing of its highest call. Thus the preordained reversal operation takes place primarily during periods of incoming traffic and an absence of landing call demand.

If it is desired, any one of the cars may be taken out of group operation and operated independently of the other cars. Also, it is to be understood, that one or more cars may be automatically removed from group operation in any suitable manner during periods of intermittent service and conversely may be automatically put into group operation, as demand increases. However, for simplicity, manual switches KS1a and KS2a have been provided to remove a car from or restore it to group operation.

Assume that car *a* is removed from group operation by opening manual switch KS1a (Figure 2) and moving manual switch KS2a (Figure 1) to its upper position. The operation of switch KS2a inserts starter button SBa and field and brake switch contacts H2a in circuit with

the operating coil of switch SRa, rendering the starting of car *a* subject to starter button SBa from within the car. Also, the opening of manual switch KS1a (Figure 2) causes switch CSa to release and engage contacts CS3a, thereby completing a circuit for the coil of nonstop switch NSa. Switch NSa operates to separate contacts NS1a, disabling the landing call pick-up circuits for car *a* to prevent car *a* from responding to landing calls.

Switch CSa also separates contacts CS2a (Figure 3), disabling the selecting and dispatching mechanism for selecting car *a* for dispatching. In addition, this switch separates contacts CS4a, disabling the car position circuits of car *a*, thereby preventing the position of car *a* from affecting the down dispatching and up dispatching demand totalizer circuits of Figure 4. Switch CSa also separates contacts CS1a (Figure 4), inserting a portion of resistor PDDR1 in the down demand totalizer circuits, increasing to a totalization of say 20 the units of predicted and registered down demand to effect the down dispatching of a selected car. Similarly, switch CSa separates contacts CS5a, inserting a portion of resistor PDUR1 in the up demand totalizing circuits, causing the up dispatching of a selected car to be effected upon the totalization of say 20 units of predicted and registered up demand. For purposes of further discussion it will be assumed that with one car removed from group operation, the number of units of demand for dispatching a selected car is increased to 20.

To illustrate such two car operation, assume that car *a* is removed from service, that car *b* is positioned at the lower dispatching landing, and is selected as the next car to be dispatched, and that car *c* is positioned at the upper dispatching landing and is selected as the next car to be dispatched. Under such conditions, brush PDBc (Figure 3) is in engagement with stationary contact PDC17c, completing a circuit for the coil of switch 17PID, which switch is in operated condition, thereby maintaining contacts 17PID1 (Figure 4) separated in the up dispatching totalizer chain. Also brush PUBb (Figure 3) is in engagement with stationary contact PUC1b, completing a circuit for the coil of switch IPIU, which switch is in operated condition, thereby maintaining its contacts IPIU1 (Figure 4) separated in the down dispatching totalizer chain. Under such conditions, 17 units of predicted up demand are totalized for car *b*, which is insufficient to cause it to be dispatched. Also, 17 units of predicted down demand are totalized for car *c*, an insufficient amount to cause it to be dispatched. Therefore, both cars *b* and *c* remain standing at their respective dispatching landings.

Next assume that a car call for the 7th landing is registered in car *b*, adding 5 units of registered demand to the previously existing 17 units of predicted up demand. Thus, a total of 22 units of predicted and registered up demand is totalized for car *b*, an amount sufficient to cause tube PTU to conduct enough current to operate switch PDU, causing car *b* to be dispatched upward, as has been previously described. Car *b* in traveling upward answers the car call at the 7th landing and proceeds to the upper dispatching landing.

As car *b* leaves the lower dispatching landing, brush PUBb (Figure 3) rides off of stationary contact PUC1b, interrupting the circuit through the coil of switch IPIU. Switch IPIU releases to engage contacts IPIU1 (Figure 4), introducing predicted up demand resistor 1PUR, for the first landing, in the down demand totalizer circuit, thereby adding 4 additional units of predicted demand to the predicted down demand totalized for car *c*. Thus, a total of 21 units of predicted down demand is totalized for car *c*, an amount sufficient to cause tube PTD to conduct enough current to operate switch PDD, causing car *c* to be dispatched downward, as has been previously described, and to proceed to the lower dispatching landing.

Therefore, it is seen that under the assumed conditions,

upon the registration of a car call in the selected car at the lower dispatching landing, it is dispatched upward, travels to the upper dispatching landing and parks there, becoming selected as the next car to be dispatched downward; while the selected car at the upper dispatching landing is dispatched downward, travels to the lower dispatching landing and parks there, becoming selected as the next car to be dispatched upward.

It may be noted, that the registration of an up landing call also adds 5 units of registered up demand to the 17 units of predicted up demand totalized for selected car *b* at the lower dispatching landing, resulting in its being dispatched, as has been just described for the registration of a car call in car *b*. Similarly, the registration of a down landing call or of a car call in selected car *c* at the upper dispatching landing adds 5 units of registered down demand to the 17 units of predicted down demand totalized for selected car *c* to effect the dispatching of car *c* downward.

If it is desired for a particular installation, a certain portion of the registered and predicted demand ahead of the car next preceding the selected car may be added to the registered and predicted demand behind such next preceding car for controlling the selected car. This may be accomplished by closing manual switches KSUa-c and KSDa-c in the demand totalizer circuits of Figure 4 thereby rendering brush pairs BPU, 2BPU and BPD, 2BPD effective for inserting Zener diodes ZDU in the up demand totalizer circuit and Zener diodes ZDD in the down demand totalizer circuit, for cars *a* through *c*.

With reference to brush pair BPUa, 2BPUa and Zener diode ZDUa which are associated with car *a* in the up demand totalizer circuit, as car *a* moves upward from the lower dispatching landing, brush BPUa engages stationary contact PU2a and rides off of stationary contact PU1a, while brush 2BPUa engages stationary contact PU1a, thereby inserting the circuit comprising contacts UP7a, manual switch KSUa and Zener diode ZDUa in shunting relationship with contacts 2PIU1. As has been previously described, as car *a* moves upward to the 2nd landing, brush PUBa (Figure 3) engages stationary contact PUC2a and rides off of stationary contact PUC1a, causing switch 2PIU to operate and separate its contacts 2PIU1 (Figure 4). However, contacts 2PIU1 are now shunted by Zener diode ZDUa, for purposes to be explained.

As car *a* moves upward from the 2nd landing, brush BPUa engages stationary contact PU3a and rides off of stationary contact PU2a, while brush 2BPUa engages stationary contact PU2a and rides off of stationary contact PU1a, thereby inserting the shunting circuit across contacts 3PIU1, while removing it from across contacts 2PIU1. At the same time, brush PUBa (Figure 3) engages stationary contact PUC3a and rides off of stationary contact PUC2a, causing switch 3PIU to operate and switch 2PIU to release, as has been described, thereby separating contacts 3PIU1 (Figure 4) and engaging contacts 2PIU1, respectively. As car *a* continues upward, contacts 4PIU1 through 16PIU1 and 17PID1 are likewise separated and then engaged in sequence, each pair of contacts in the up demand totalizer chain while in separated condition being shunted by Zener diode ZDUa.

Similarly, if it is assumed that car *a* is dispatched downward from the upper dispatching landing, as it travels downward, contacts 16PID1 through 2PID1 and 1PIU1 are likewise sequentially separated and engaged. However, as each pair of contacts in the down demand totalizer chain is thus separated, brush pair BPDa, 2BPDa inserts the circuit comprising Zener diode ZDDa, manual switch KSDa and contacts DNSa across the separated contacts. Similar shunting circuits are provided for cars *b* and *c*.

Zener diodes ZDU, ZDD in the aforementioned shunting circuits are circuit elements which when in conducting condition inherently have a constant voltage drop

across their terminals while conducting various inverse currents. Each of these diodes, as it is connected in shunting relationship to the first pair of contacts in the totalizer chain, has a potential applied across its terminals of sufficient magnitude to cause it to conduct a certain inverse current. With proper selection of the Zener diodes, the magnitude of this inverse current is dependent upon and varies with the ohmic value of the demand resistors which represent the registered and predicted demand at landings ahead of a next preceding car for a given direction of travel and which are connected in parallel with each other and in series with the Zener diode associated with such next preceding car for that direction of travel. This inverse current flows through that Zener diode and through the totalizer resistor (PDUR1, PDDR1) associated with that direction of travel. Such current is additive to the current flow due to demand resistors connected in parallel in that totalizer circuit, whose ohmic values represent the registered and predicted demand in units totalized behind the next preceding car. As the demand ahead of the next preceding car increases, additional demand resistors are connected in the parallel circuit which is connected in series with the Zener diode associated with that car causing the inverse current flow through that diode to increase. Thus, by proper selection of these Zener diodes (ZDD, ZDU) in relation to the other circuit parameters in the totalizer circuits, a predetermined portion of the demand ahead of the next preceding car is added to the demand behind it to effect dispatching of the selected car.

Assume that, for purposes of this embodiment, the Zener diodes in the respective shunting circuits for cars *a* through *c* have been selected so as to allow one third of the registered and predicted demand ahead of the next preceding car to be added to the demand behind it. Also assume that 15 units of totalized demand are required to initiate dispatching of the selected car.

To illustrate the dispatching of a selected car by the summation of the predicted and registered demand behind the next preceding car and a certain portion of the predicted and registered demand ahead of that next preceding car (in this case one third), assume that car *a* has been dispatched upward and is presently at the 3rd landing and that car *c* has arrived at the upper dispatching landing and is set for down travel. Further assume that car *b* is the next car selected to be dispatched upward. Under such conditions, contacts 3PIU1 (Figure 4) are separated and brush BPUa is in engagement with stationary contact PU3a, while brush 2BPUa is in engagement with stationary contact PU2a, inserting Zener diode ZDUa in shunting relationship with separated contacts 3PIU1. Further assume that up landing calls are registered at the 10th and 12th landing. Under such conditions, 2 units of up demand, due to the predicted up demand established for the 2nd landing, exist behind next preceding car *a* and 25 units of up demand exist ahead of it, 10 due to registered up landing calls at 5 units each and 15 due to predicted demand resistors 3PUR through 16PUR connected in parallel. Therefore, Zener diode ZDUa conducts a certain current corresponding to 8.33 demand units or one third of the registered and predicted demand ahead of next preceding car *a*. In such a case, the total demand effective in the up totalizer circuit is 10.33 units, 8.33 units due to demand ahead and 2 units due to demand behind.

Next assume that an up landing call is registered for the 15th landing, adding another 5 units of up demand ahead of next preceding car *a*. Under such conditions, Zener diode ZDUa conducts a certain current corresponding to 10 units of demand around separated contacts 3PIU1 into the up demand totalizer circuit. Therefore, 12 units of up demand are presently totalized ahead of selected car *b*, an amount insufficient to initiate dispatching of selected car *b*. Next assume that an up landing call is registered at the 2nd landing, adding 5 units of

registered up demand behind next preceding car *a*, thereby increasing the totalized demand to 17 units, causing tube PTU to conduct and initiate dispatching of selected car *b*, as was previously described.

Next assume that instead of an up landing call being registered for the 2nd landing, in the previous example, 3 more up landing calls for the 7th, 9th and 14th landings, respectively, are registered ahead of next preceding car *a*. Under such conditions, 45 units of up demand exist ahead of next preceding car *a*, an amount sufficient to increase the current conduction through Zener diode ZDUa to a value corresponding to 15 units of demand, making a total of 17 units for car *b*, an amount sufficient to initiate dispatching of car *b* upward.

Therefore, it is seen that with manual switches KSUa-c and KSDa-c in closed position in the demand totalizer circuits, a selected car is dispatched upon the occurrence of either a certain demand ahead of it and behind the next preceding car or a combination of such demand behind and a certain portion of demand ahead of such next preceding car. In this manner a relatively large amount of demand ahead of the next preceding car appreciably hastens the dispatching of the selected car.

In summary, it therefore can be seen that with proper selection of the predicted demand factors for each individual landing and the amount of totalized demand for dispatching cars from the dispatching landings for a particular installation, such a system automatically adjusts to the various traffic conditions occurring throughout the day. During periods of interim traffic the cars are automatically dispatched at approximately regular intervals to provide substantially balanced service. Increased traffic demand ahead of a selected car automatically hastens its dispatching. Transient fluctuations in demand affect only one car, while demand existing over a prolonged period may affect all cars. A peak demand of traffic in one direction automatically shortens the interval between the dispatching of selected cars from the dispatching landing for that direction. A car call registered for a certain period in a selected car at each dispatching landing causes that car to be advanced dispatched. During periods of up peak traffic conditions, selected cars at the lower dispatching landing which have long wait car calls in registration or which become loaded are automatically advanced dispatched, and in the absence of landing calls registered for a certain period are automatically pre-ordered to reverse at their highest call and return to the lower dispatching landing. During periods of down peak traffic, up traveling cars are automatically selected, reversed and down dispatched at their landings of highest call, provided that they have traveled to the top portion of the building and sufficient down demand is totalized ahead of them. Upon the removal of a car from group operation, the system automatically changes the amount of totalized demand for dispatching the remaining cars, accordingly. Furthermore, such a system is readily adaptable to changes in the service characteristics of the tenacy of the various landings. All that need be done to adjust the system to a change in the tenacy of a landing is to adjust the predicted demand resistors for that landing accordingly. It may also be noted, that if it is desired to give preferred service to calls registered from a particular landing, this is easily accomplished by proper selection and adjustment of the registered demand resistors (RUR, RDR, Figure 4) for that landing. For example, registered up demand resistor 15RUR may be selected of an ohmic value so as to add 10 units of up demand in the up demand totalizer circuits, upon registration of an up landing call at the 15th landing, thereby giving a call registered at that landing the weight of two landing calls in the previously described embodiment.

As changes can be made in the above described construction and many apparently different embodiments of this invention can be made without departing from the scope thereof, it is intended that all matter contained in

the above description or shown on the accompanying drawings be interpreted as illustrative only and not in a limiting sense.

What is claimed is:

1. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching from said dispatching landing, dispatching means for dispatching said selected cars from said dispatching landing, predicted demand means for each of said served landings for permanently establishing an anticipated demand for service for the landing for which it is provided, registered demand means for each of said served landings operable for registering actual demand for service for the landing for which it is provided, and dispatching control means responsive to the total service demand established by said predicted demand means and registered by said registered demand means to which the then selected car is subject for causing said dispatching means to dispatch said selected car when such total service demand exceeds a certain amount.

2. In an elevator control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, a plurality of first means, one for each of said plurality of landings except the uppermost landing, for continuously establishing a certain anticipated demand for service in a direction away from said dispatching landing in accordance with the characteristics of the tenacy of the landing for which that first means is provided, a plurality of second means, one for each of said plurality of landings, for continuously establishing a certain anticipated demand for service in a direction toward said dispatching landing in accordance with the characteristics of the tenacy of the landing for which that second means is provided, means for detecting the position and direction of travel of said cars in traveling away from and toward said dispatching landing, means for selecting the cars for dispatching from said dispatching landing, and dispatching means controlled by said first and second means and said detecting means for dispatching said selected cars from said dispatching landing, said dispatching means dispatching said selected car under conditions where a certain amount of anticipated service demand is established behind all cars previously dispatched from said dispatching landing.

3. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, dispatching means for dispatching the cars from said dispatching landing, selecting means for selecting a car to be dispatched from said dispatching landing, predicted demand means continuously establishing an anticipated demand for service for each of said served landings, registered demand means operable for registering actual demand for service for each of said served landings, demand summation means subject to said predicted demand means and said registered demand means for totalizing said demands for service, and circuit control means responsive to said demand summation means for causing said dispatching means to dispatch a selected car when said totalized demand for service to which that car is subject exceeds a certain amount.

4. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting one of said cars for dispatching from said dispatching landing, landing call registering means common to said cars for registering demands for service at each of said landings, car call registering means individual to each of said cars for registering demands for service by that car, means for each of said landings common to said cars for continuously establishing a predicted demand for service for that landing, and dispatching means controlled by said registered and predicted demand means for dispatching from said dispatching landing a car se-

lected by said selecting means under conditions where there exists a certain amount of said service demand to which said selected car is subject.

5. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting said cars for dispatching in a given direction from said dispatching landing, landing call registering means for each of said served landings and common to said cars for registering actual demand for service in said given direction from the landing for which it is provided, means for each of said served landings and common to said cars for continuously establishing a predicted demand for service in said given direction from the landing for which it is provided, demand summation means for totalizing the actual demand registered by said landing call registering means and the predicted demand established by said predicted demand means, car position sensing means responsive to the relative positions and directions of travel of said cars for isolating the registered and predicted demand ahead of the car next preceding said selected car from being totalized by said demand summation means, and dispatching means controlled by said demand summation means for causing a car selected by said selecting means to be dispatched under conditions where at least a certain amount of service demand is totalized by said demand summation means.

6. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting said cars for dispatching in a given direction from said dispatching landing, landing call registering means, one for each of said served landings and common to said cars, for registering actual demands for service from said landings in said given direction, car call registering means for each car, one for each of said served landings, for registering actual demand for service from within that car, means for each of said served landings and common to said cars for continuously establishing a predicted demand for service in said given direction from the landing for which it is provided, demand summation means for totalizing the actual service demand in said given direction registered by said landing call registering means, actual service demand registered by said car call registering means for the selected car and the predicted service demand established by said predicted demand means, car position sensing means responsive to the relative positions and directions of travel of said cars for preventing the service demands registered and established for landings ahead of the car next preceding said selected car from being totalized by said demand summation means, and dispatching means controlled by said demand summation means for causing said selected car to be dispatched under conditions where at least a certain amount of said service demand is totalized by said demand summation means.

7. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting said cars for dispatching in a given direction of travel from said dispatching landing, car call means for each of said cars for each of said served landings for registering an actual demand for service, landing call registering means for each of said served landings for registering actual demand for service in said given direction from the landing for which it is provided, means for each of said served landings for establishing for the landing for which it is provided a predicted demand for service in said given direction, demand summation means for totalizing for landings between said dispatching landing and the car next preceding the selected car the service demand registered in said selected car and the service demand in said given direction registered by said landing call registering means and predicted for such landings,

means responsive to load conditions in the cars ahead of said selected car for determining which of said cars ahead is the next preceding car, and dispatching means responsive to the totalization by said demand summation means of at least a certain amount of service demand for causing said selected car to be dispatched.

8. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting said cars for dispatching in a given direction of travel from said dispatching landing, car call means for each of said cars for registering for the car selected by said selecting means as next to be dispatched an actual demand for service, landing call registering means for each of said served landings and common to said cars for registering actual demand for service in said given direction from the landing for which it is provided, means for each of said served landings and common to said cars for establishing for the landing for which it is provided a predicted demand for service in said given direction, load responsive means for each of said cars for determining the load condition of the car for which it is provided, sensing means responsive to the relative positions and directions of travel of said cars and to their respective load responsive means for determining the car traveling in said given direction which next precedes the selected car and is carrying less than a certain load, demand summation means responsive to said sensing means for totalizing the service demand registered in the selected car with the service demand in said given direction registered by said landing call registering means and established by said predicted demand means for landings located between the car which is determined to be such next preceding car by said sensing means and said dispatching landing, and dispatching means responsive to the totalization by said demand summation means of at least a certain amount of service demand for causing said selected car to be dispatched.

9. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a lower dispatching landing, said system comprising, means for selecting the cars for dispatching from said dispatching landing, means for dispatching the selected cars from said dispatching landing, means for each of said served landings for registering for that landing a call in a given direction from that landing, adjustable actual demand means controlled by said call registering means for each of said served landings, each of said adjustable actual demand means being adjusted in accordance with the predetermined service characteristics of the landing for which it is provided for registering a certain actual service demand for that landing, adjustable predicted demand means for each of said served landings, each of said adjustable predicted demand means being adjusted in accordance with the anticipated demand in a given direction from the landing for which it is provided for establishing a certain predicted service demand in said given direction from that landing, and means responsive to a certain total of said predicted and actual service demand to which the selected car is subject for causing operation of said dispatching means to dispatch said selected car from said dispatching landing.

10. In an elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from an upper dispatching landing and a lower dispatching landing, up landing call registering means for each of said landings other than said upper dispatching landing for registering actual demand for service in the up direction from the landing for which it is provided, down landing call registering means for each of said landings other than said lower dispatching landing for registering actual demand for service in the down direction from the landing for which it is provided, adjustable up predicted demand means for each of said landings other than said upper dispatching landing, each of said up pre-

dicted demand means being proportional to the actual demand for the landing for which it is provided and being adjusted in accordance with the up predicted demand for that landing for continuously establishing a certain demand for service in the up direction from that landing, adjustable down predicted demand means for each of said landings other than said lower dispatching landing, each of said down predicted demand means being proportional to the actual down demand for the landing for which it is provided and being adjusted in accordance with the down predicted demand for that landing for continuously establishing a certain demand for service in the down direction from that landing, sensing means for sensing the positions and directions of travel of said cars, selecting means for each of said dispatching landings for selecting one of said cars for dispatching from the dispatching landing for which it is provided, dispatching means for each of said dispatching landings for dispatching the car selected by said selecting means provided for that dispatching landing, and summation means for each of said dispatching landings for totalizing the registered and predicted service demand behind the next preceding car dispatched from the dispatching landing for which that summation means is provided, each of said summation means being responsive to said sensing means for actuating its associated dispatching means to cause dispatching of said selected car from its associated dispatching landing when such totalized demand exceeds a predetermined amount.

11. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching from said dispatching landing, means for dispatching the selected cars from said dispatching landing, means for each of said served landings for registering for that landing a landing call for a given direction from that landing, a landing call demand resistor for each of said served landings and common to said cars, each of said landing call demand resistors being of an ohmic value representative of the weight assigned to actual demand for service in said given direction for the landing for which it is provided for registering a certain actual service demand for that landing under conditions where a landing call is registered for that given direction for that landing, a predicted demand resistor for each of said served landings and common to said cars, each of said predicted demand resistors being of an ohmic value representative of the weight assigned to predicted demand for service in said given direction for the landing for which it is provided for establishing a certain predicted service demand for that landing, a source of unidirectional current, summation means including means for connecting in parallel said landing call demand resistors and said predicted demand resistors for landings located behind the car next preceding the selected car for energization by said current source, said summation means being adapted for totalizing the registered actual service demand and the predicted service demand to which the selected car is subject, and means controlled by said summation means for causing said dispatching means to dispatch said selected car under conditions where the totalized service demand is at least a certain amount.

12. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching from said dispatching landing, means for dispatching the selected cars from said dispatching landing, means for each of said served landings for registering for that landing a landing call for a given direction from that landing, a landing call demand resistor for each of said served landings and common to said cars, each of said landing call demand resistors being of an ohmic value representative of the weight assigned to actual demand for service in said given direction for the landing for which it is provided for

registering a certain actual service demand for that landing under conditions where a landing call is registered for that given direction for that landing, a predicted demand resistor for each of said served landings and common to said cars, each of said predicted demand resistors being of an ohmic value representative of the weight assigned to predicted demand for service in said given direction for the landing for which it is provided for establishing a certain predicted service demand for that landing, means for each of said cars for registering for that car, car calls for service, a car call demand resistor for each of said cars and common to said car calls registered in the car for which it is provided, each of said car call demand resistors being of an ohmic value representative of the weight assigned to an actual demand for service in the car for which it is provided for registering a certain actual service demand in that car under conditions where it is the selected car and at least one car call is registered in that car, a source of unidirectional current, summation means including means for connecting in parallel with each other said landing call demand resistors and said predicted demand resistors for landings located behind the car next preceding the selected car and said car call demand resistor for the selected car for energization by said current source, said summation means being adapted for totalizing the registered actual service demand and the predicted service demand to which the selected car is subject, and means controlled by said summation means for causing said dispatching means to dispatch said selected car under conditions where the totalized service demand is at least a certain amount.

13. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, dispatching means for dispatching said cars from said dispatching landing, selecting means for selecting the cars for dispatching by said dispatching means, predicted demand means for each of said served landings and common to said cars for continuously establishing a predicted demand for service for the landing for which it is provided, registered demand means for each of said served landings and common to said cars for registering actual demand for service for the landing for which it is provided, summation means subject to said predicted demand means and said registered demand means and operable for causing said dispatching means to dispatch the selected car under conditions where the combined sum of predicted and actual service demand to which that selected car is subject is at least a certain amount, and expediting means responsive to an operating condition of the selected car at the dispatching landing for causing said dispatching means to dispatch said selected car under conditions where said combined sum of service demand is less than said certain amount.

14. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing as claimed in claim 13, wherein said expediting means comprise means responsive to a certain load condition of said selected car for actuating said dispatching means.

15. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing as claimed in claim 13, wherein said expediting means comprise means responsive to registration of an actual demand for service in a selected car positioned at the dispatching landing, timing means for establishing a time interval measured from the registration of such an actual demand for service in said selected car, and control means subject to said timing means for actuating said dispatching means at the expiration of said time interval.

16. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings and having an upper dispatching landing comprising, means for selecting the cars for dispatching from said

dispatching landing, means for dispatching the selected cars from said dispatching landing, means for each of said served landings for registering for that landing a call for a direction away from said dispatching landing, means for establishing for each of said served landings a predicted service demand in a direction away from said dispatching landing, means controlled by said call registering means for each of said served landings for registering actual service demand for such landings, means responsive to a certain totalized predicted and actual service demand for causing operation of said dispatching means to dispatch a selected car from said dispatching landing, and means operable under conditions where there is no selected car at said dispatching landing when said certain totalized service demand conditions arise for causing dispatching from a landing below said dispatching landing of a car which has reached its highest call.

17. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting said cars for dispatching in a given direction away from said dispatching landing, predicted demand means for each of said landings and common to said cars for continuously establishing a predicted demand for service in said given direction for the landing for which it is provided, landing call registering means for each of said landings and common to said cars for registering actual demand for service in said given direction and in a direction opposite to said given direction from the landing for which it is provided, car call registering means for each of said cars for registering actual demands for service in that car, means responsive to the relative positions and directions of travel of said cars for determining the car next preceding the selected car in said given direction, demand summation means subject to said determining means for totalizing the predicted demand and landing call registered demand in said given direction for landings located behind said next preceding car, and dispatching means controlled by said demand summation means for causing said selected car to be dispatched under conditions where said totalized service demand is at least a certain amount and in the absence of a selected car at said dispatching landing under such conditions, causing a car traveling toward said dispatching landing to be reversed at and dispatched from the landing nearest said dispatching landing for which a call to which that car is subject is registered.

18. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said landings including a predetermined number of landings in a zone adjacent said dispatching landing, said system comprising, means for selecting the cars for dispatching in a given direction from said dispatching landing, predicted demand means, one for each of said served landings, for continuously establishing a predicted demand for service in said given direction from that landing, landing call registering means, one for each of said served landings and common to said cars, for registering actual demand for service in said given direction from that landing and in a direction opposite to said given direction, car call registering means individual to each of said cars for registering actual demands for service in the car for which it is provided, means responsive to the positions and directions of travel of said cars for determining the car next preceding the selected car in said given direction, demand summation means for totalizing the predicted demand and landing call registered demand in said given direction from landings located behind said next preceding car, dispatching means controlled by said demand summation means for causing said selected car to be dispatched under conditions where said totalized demand is at least a certain amount and, in the absence of a car at said dispatching landing under such conditions, causing a car traveling toward said dispatching landing to reverse at the landing nearest

said dispatching landing for which a call is registered provided that such landing is within said adjacent zone and, in the absence of a call registered for a landing in said zone under such conditions, causing said traveling car to reverse at the landing furthest from said dispatching landing within said zone.

19. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing comprising, means for selecting the cars for dispatching from said dispatching landing, means for dispatching the selected cars from said dispatching landing, means for each of said served landings for registering a call for that landing, means for establishing for each of said served landings a predicted service demand, means controlled by said call registering means for each of said served landings for registering actual service demand for such landings, means responsive to a certain totalized service demand for causing operation of said dispatching means to dispatch a selected car from said dispatching landing and for causing the dispatched car to continue to the farthest landing before reversal, means indicative of a certain service to be provided for passengers entering a selected car at said dispatching landing for causing advance dispatching of the selected car by said dispatching means, and means responsive to said advance dispatching operation under conditions where none of said landing calls has been in registration for a certain time interval for setting the dispatched car for reversal at its landing of farthest call.

20. An elevator dispatching and control system as claimed in claim 19 wherein, said means indicative of a certain service to be provided comprise means responsive to a certain load condition of said selected car at said dispatching landing.

21. An elevator dispatching and control system as claimed in claim 19 wherein, said means indicative of a certain service to be provided comprise means responsive to the registration of a long wait car call in the selected car at said dispatching landing.

22. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching from said dispatching landing, means for dispatching the selected cars from said dispatching landing, means for each of said served landings for registering a call for that landing, means controlled by said call registering means for each of said served landings for registering certain actual service demand for such landings, means for establishing for each of said served landings a predicted service demand, totalizing means subject to said controlled means and said establishing means for totalizing the actual and predicted service demand registered and established for landings located behind the car next preceding the selected car, actuating means controlled by said totalizing means for causing said dispatching means to dispatch said selected car under conditions where at least a certain amount of said service demand is totalized and for causing the said dispatched car to continue to the farthest landing before reversal, expediting means responsive to an operating condition of said selected car at said dispatching landing for causing advance dispatching of said selected car by said dispatching means before such totalized service demand reaches said certain amount, and means responsive to said advance dispatching operation under conditions where none of said landing calls has been in registration for a certain time interval for preordaining reversal of the dispatched car at its landing of farthest call.

23. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching from said dispatching landing, means for dispatching the selected cars from said dispatching landing, car call registering means

for each of said cars for registering a call for service from within that car, means controlled by the car call registering means for the selected car for registering an actual demand for service from within the selected car, means for each of said served landings for registering a landing call for that landing, means controlled by said landing call registering means for each of said served landings for registering actual service demand for such landings, means for establishing for each of said served landings a predicted service demand, totalizing means subject to said controlled means and said establishing means for totalizing the actual and predicted service demand registered and established for landings located behind the car next preceding the selected car with the actual service demand registered within the selected car, actuating means controlled by said totalizing means for causing said dispatching means to dispatch said selected car under conditions where at least a certain amount of said service demand is totalized and for causing the said dispatched car to continue to the farthest landing before reversal, expediting means responsive to an operating condition of said selected car at said dispatching landing for causing advance dispatching of said selected car by said dispatching means under conditions where such totalized service demand is less than said certain amount, and means responsive to said advance dispatching operation under conditions where none of said landing calls has been in registration for a certain time interval for pre-ordinating reversal of the dispatched car at its landing of farthest call.

24. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, dispatching means for dispatching the cars in a given direction of travel from said dispatching landing, selecting means for selecting the cars for dispatching by said dispatching means, predicted demand means for each of said served landings and common to said cars for continuously establishing a predicted demand for service in said given direction for the landing for which it is provided, registered demand means selectively operable by intending passengers at said landings for registering actual demands for service in said given direction and in a direction opposite thereto from said landings, car position determining means for determining the position of the car next preceding said selected car, summation means responsive to said predicted demand means and said registered demand means for causing said dispatching means to dispatch said selected car under conditions where the total of predicted demand and registered actual demand in said given direction for landings located ahead of said selected car and behind said next preceding car is at least a certain amount, expediting means responsive to an operating condition of said selected car at said dispatching landing for causing said dispatching means to dispatch said selected car under conditions where such total of predicted demand and registered actual demand is less than said certain amount, and control means operatively responsive to said registered demand means and said expediting means for causing said selected car to reverse at the landing farthest from said dispatching landing at which it answers a call for service to which it is subject under conditions where dispatching is caused by said expediting means and where none of said registered actual demands at said landings have been registered for at least a first certain time before the occurrence of said operating condition of said selected car and where all previously existing registered actual demands have been answered for at least a second certain time before said occurrence.

25. A control and dispatching system as claimed in claim 24, wherein said expediting means comprise load responsive means in said selected car for determining the load condition of said selected car while it is at said dispatching landing, and means operable by said load re-

sponsive means when a certain load condition exists in said selected car at said dispatching landing for causing said dispatching means to dispatch said selected car.

26. A control and dispatching system as claimed in claim 24, wherein said expediting means comprise means responsive to the registration of an actual demand for service for a certain period in a car positioned at said dispatching landing and selected as next to be dispatched for causing said dispatching means to dispatch said selected car.

27. A dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching in a given direction of travel from said dispatching landing, means for registering an actual demand for service from within the car selected by said selecting means as next to be dispatched, landing call registering means, one for each of said served landings and common to said cars, for registering actual demands for service in said given direction from said landings, means for each of said served landings and common to said cars for continuously establishing a predicted demand for service in said given direction from the landing for which it is provided, sensing means responsive to the relative positions and directions of travel of said cars for determining the car traveling in said given direction which next precedes the selected car, demand summation means subject to said sensing means for totalizing an actual service demand registered in the selected car with the actual and predicted demands for service in said given direction registered and established for the served landings located between the car determined by said sensing means to be such next preceding car and said dispatching landing, dispatching means controlled by said demand summation means for dispatching said selected car under conditions where at least a certain amount of said service demand is totalized by said demand summation means, a plurality of load responsive means, one for each of said cars, for determining the load condition of the car for which it is provided, control means responsive to the load responsive means in said selected car at the dispatching landing and operable for dispatching that selected car in said given direction under conditions where the load in that car is at least a predetermined amount and said totalized demand is less than said certain amount, and conditioning means subject to said landing call registering means and said control means for conditioning that selected car to reverse at the landing of its highest call under conditions where all previously existing landing calls have been answered for at least a first certain time and landing calls registered subsequent to the expiration of said first certain time are not in registration for at least a second certain time.

28. An elevator control and dispatching system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, means for selecting the cars for dispatching in a given direction from said dispatching landing, predicted demand means for each of said served landings and common to said cars for continuously establishing a predicted demand for service in said given direction from the landing for which it is provided, landing call registering means, one for each of said served landings and common to said cars, for registering actual demands for service in said given direction and in a direction opposite to said given direction from said landings, car call registering means individual to each of said cars for registering actual demands for service for said served landings from within the car for which it is provided, sensing means responsive to the positions and directions of travel of said cars for determining the position of the car next preceding the selected car, control means subject to said car call registering means from the selected car and operable from a first condition to a second condition upon the expiration of a predetermined time measured from

the registration of an actual demand for service within a car positioned at said dispatching landing and selected as next to be dispatched, demand summation means subject to said sensing means for totalizing the predicted demand established and the landing call demand registered for said given direction for landings located ahead of said selected car and behind said next preceding car with an actual demand registered in said selected car, dispatching means controlled by said demand summation means and said control means for dispatching said selected car under conditions where said totalized demand is at least a certain amount and, in the absence of at least such an amount of totalized demand, upon actuation of said control means to said second condition, and conditioning means responsive to said landing call registering means and said control means for conditioning said selected car to reverse its direction of travel after responding to the car calls and landing calls in registration to which it is subject under conditions where said dispatching is in response to actuation of said control means to said second condition and all previously existing landing calls have been answered for at least a first certain period and landing calls registered after the expiration of said first certain period have not been in registration for at least a second certain period.

29. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, dispatching means for dispatching the cars in a given direction of travel from said dispatching landing, selecting means for selecting the cars for dispatching by said dispatching means, predicted demand means for each of said served landings for establishing a predicted demand for service in said given direction for the landing for which it is provided, landing call registering means for each of said served landings for registering actual demand for service in said given direction from the landing for which it is provided, integrating means responsive to the positions and directions of travel of said cars and operable in accordance with their respective movements in said given direction for adding a certain portion of the service demand established and registered for landings ahead of the car next preceding said selected car in said given direction to such service demand established and registered for landings behind that next preceding car, and control means actuable by said integrating means for causing said dispatching means to dispatch said selected car under conditions where the net integrated sum of said certain portion of established and registered service demand ahead and said established and registered service demand behind is at least a certain amount.

30. An elevator dispatching and control system for a plurality of elevator cars serving a plurality of landings from a dispatching landing, said system comprising, dispatching means for dispatching the cars in a given di-

rection of travel from said dispatching landing, selecting means for selecting the cars for dispatching by said dispatching means, predicted demand means, one for each of said served landings, for continuously establishing a demand for service in said given direction for that landing, landing call registering means, one for each of said served landings and operable by intending passengers at that landing, for registering an actual demand for service in said given direction for that landing, integrating means, one for each of said cars, responsive to the position and direction of travel of that car and operable in accordance with its movement in said given direction for adding a predetermined portion of said service demand ahead of that car to said service demand behind that car, and control means responsive to said integrating means for causing said dispatching means to dispatch the selected car under conditions where the net sum of said predetermined portion of service demand ahead of the car next preceding said selected car and said service demand behind that next preceding car is at least a certain amount.

31. A system as claimed in claim 30, wherein circuit interrupting means are provided, one for each of said landings, each including a pair of electrical contacts connected in series relationship with each other in accordance with the relative locations of the landings for which they are provided and being adapted to be sequentially separated and engaged in accordance with movement of said cars past said landings in said given direction of travel, and wherein said integrating means each include current limiting means adapted to be connected in shunting relationship to the electrical contact pair which is in separated condition in accordance with movement of the car for which that integrating means is provided for causing an amount of current representative of said predetermined portion of service demand ahead to bypass said separated electrical contacts.

32. A system as claimed in claim 30, wherein current interrupting means are provided, one for each of said landings, each including a pair of electrical contacts connected in series relationship with each other in accordance with the relative locations of the landings for which they are provided and being adapted to be sequentially separated and engaged in accordance with movement of said cars past said landings in said given direction of travel, and wherein said integrating means each include a Zener diode adapted to be connected in shunting relationship to the electrical contact pair which is in separated condition in accordance with movement of the car for which that integrating means is provided for causing an amount of current representative of said predetermined portion of service demand ahead to bypass said separated contacts.

No references cited.