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DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN ELEVATOR SYSTEMS

(71) We, OTIS ELEVATOR COMPANY, a corporation organized and existing under the laws of the State of New Jersey, United States of America, of 260 Eleventh Avenue, New York, New York, 10001, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to elevator systems for cars having multiple passenger compartments. More particularly, it pertains to improvements in elevator systems for cars having two compartments.

In a suitable installation, a double compartment elevator car can serve two landings simultaneously. Thus it operates more efficiently than a single compartment car would in the same installation because it can answer the same number of calls in less time with less steps.

One known arrangement for multicompartment cars operates a group of such cars under the control of a well known group supervisory system in which the cars travel in what is known as round trips. Each car starts each trip from the bottom terminal, travels up either to the top terminal or to a landing below that terminal for which a call is registered, usually the highest call, and then returns to the bottom terminal. During light traffic periods all cars park at the bottom terminal waiting to be dispatched as needed.

Recently it has become more desirable to operate groups of elevator cars in systems which segregate the landings served by the cars into zones of landings. During light traffic periods the cars of these systems are parked in zones in a distributed fashion throughout the hoistway. In systems of this type with single compartment elevator cars, the answering of up and down hall calls registered at the landings is straightforward. A hall call is registered either at the landing at which a car is located or above or below that landing.

The answering of an up or a down hall call registered at the landing at which a single compartment car is located is accompanied by the opening of the car's doors in response thereto. This is accomplished by providing either an arrangement in which the hall call establishes the appropriate direction of travel for the car before the doors are opened or an arrangement in which the car call registered by the passenger upon entering the car establishes the appropriate direction of travel. In neither arrangement is there anything more than a remote chance of a passenger unknowingly boarding the car and being taken in a direction opposite to that in which he desires to travel; even in those situations in which he is one of two passengers who both register calls at the same landing for opposite directions of travel. In one arrangement, that which establishes direction before the doors are opened, one of these two calls is not cancelled and the system indicates which passenger has preference in using the car. In the other arrangement both calls might be cancelled but the passengers themselves can decide who should have preference.

In those situations in which a hall call is registered either above or below the location of a single compartment car, at a landing to which the car is temporarily precluded from answering hall calls, no response ensues by that particular car. If on the other hand the car can answer the call, response is had by (1), determining the location of the landing at which the call is registered with respect to the location of the car, (2), establishing the proper direction of travel for the car in accordance with these respective locations, and (3), causing the car to start in the established direction.

Where a double compartment passenger elevator car is employed in a suitable installation having a control system in which the car can remain at rest at a position intermediate the terminal landings, it means that the car can park with its upper compartment located adjacent one landing and with its lower compartment located adjacent the next

lower landing. In these circumstances, it is desirable to have the system arranged so that the answering of a hall call for one direction of travel registered at the landing adjacent one compartment delays the answering of a hall call for the other direction of travel registered at the landing adjacent the other compartment for at least a predetermined period of time. Otherwise, one compartment could answer a hall call registered by an intending passenger desiring to travel in one direction while the other compartment was answering a hall call registered by another intending passenger desiring to travel in the opposite direction. In such a situation, one of the passengers upon boarding his compartment would be taken in a direction opposite to that in which he desires to travel.

According to this invention, there is provided an elevator system including, an elevator car having upper and lower passenger compartments operable to serve a plurality of intermediate landings and two terminal landings of a building in response to the registration of up and down hall calls at said landings, at least certain of said landings being so separated as to enable the upper and lower passenger compartments to serve two adjacent landings simultaneously, control apparatus for causing said car to stop operating and for enabling it to remain at rest with its two passenger compartments located adjacent intermediate landings in the building provided no call is registered to which it can respond; hall call answering equipment operable to cause said car to answer a registered hall call; and call answering delay equipment, operable in response to the answering of a hall call for one direction of travel at a landing adjacent one of said two passenger compartments, to delay for at least a predetermined period the answering of a hall call for the opposite direction of travel registered at the landing adjacent the other of said two passenger compartments.

In referring to the answering of a hall call herein is meant those operations which a car undergoes in order to provide service to the intending passenger who registered the call. In the disclosed embodiment these include (1), causing the car to travel to the landing at which the call is registered and to stop with one of its compartments located adjacent thereto, if one of its compartments is not already so located, (2), opening the doors of that compartment, (3), cancelling the call, and (4), lighting a hall lantern indicating the availability of the car to travel in the direction indicated by the call.

The present invention preferably also ensures that a car answers a hall call only after it has a direction of travel established which corresponds to that indicated by the call which is being answered. This ensures the availability of the car for travel in the direction indicated by the call before the call is answered. Thus, some of the operations included in answering a hall call such as cancelling the call and lighting the proper hall lantern cannot occur before the direction corresponding to the call is established. Accordingly, the passenger is provided with an indication that his call is being answered only after the car is prepared to travel in the direction indicated by his call.

It is also desirable in a system employing a double compartment car in which the car can park with its compartments located adjacent intermediate landings to have the system arranged so that the registration of a hall call at a landing at which either one of the compartments is located does not cause the car to travel to answer that call. On the contrary, the doors of the compartment located adjacent the landing at which the call is registered should open in response to the registration of the call. At the same time, of course, the car must be able to respond to calls at landings above its uppermost compartment and below its lowermost compartment.

Another advantage of multicompartment elevator cars is that the service they provide from particular landings can be restricted. In elevator systems with double compartment cars, service from the first two landings can be restricted such that passengers boarding the lower compartment at the first, or lower lobby, landing can only registered car calls for landings arbitrarily identified as odd landings while those boarding the upper compartment at the second, or upper lobby, landing can only registered car calls for the remaining landings identified as even landings. Consequently, passengers desiring to travel to the odd landings are directed to the lower lobby and are segregated into the lower compartment of each car while those desiring to travel to the even landings are directed to the upper lobby and are segregated into the upper compartment of each car. As a result, starts and stops between adjacent floors in response to car calls are avoided and the shortest possible distance between succeeding stops in response to car calls is increased to two floor heights. This substantially reduces the number of stops on each upward trip of each car and improves the overall service rendered by the cars by reducing the so-called round trip time of each car. In some systems having double compartment cars a car can stop in answer to a hall call with either compartment located adjacent an intermediate landing. If restricted service is provided in this system, provision must be made to remove the restriction to permit an intending passenger at such an intermediate landing to register a car call for any landing in either compartment. Passengers might thwart the intended purpose of the restricted service arrangement, however, if unrestricted

service were permitted as soon as the car left the first two landings. To discourage misuse of the system, restricted service is retained in both compartments until the car answers a hall call. In this way, passengers who board at either of the first two landings tend to comply with the restricted service operation. Failure to comply may result in being carried beyond the floors to which they desire to travel, since they have no guarantee that the car is going to answer a hall call before reaching those floors.

Restricted service may also be extended to an intermediate landing above the first two landings, notwithstanding passengers enter one of the compartments at this landing. To accomplish this, separate odd and even landing call registration devices are provided at this landing. In this way, intending passengers by registering whether they desired to travel to an odd or even landing cause a lower or odd landing serving compartment or an upper, or even landing serving compartment, respectively, to stop in answer to the call adjacent the landing at which the call is registered. Signs may be employed at this landing to instruct intending passengers which landings a compartment is serving so that when the doors open they may be informed as to whether the compartment will transport them to their desired destination or not.

It is, therefore, a preferred feature of this invention to provide elevator control systems having multicompartment cars with even and odd landing hall call registration devices at a particular intermediate landing and to arrange the stopping means of the cars to stop them with given ones of their compartments adjacent that particular landing in response to the registration of hall calls at that landing.

It is another preferred feature of this invention to cause a first group of cars to stop with their lower compartments adjacent a particular landing having said even and odd landing hall call registration devices in response to the registration of odd landing hall calls thereat and to prevent this first group from stopping with either compartment adjacent that landing in response to the registration of even landing hall calls; and in addition to cause the remaining second group of cars to stop with their upper compartments adjacent that particular landing in response to the registration of even landing hall calls and to prevent this second group from stopping with either compartment adjacent that landing in response to the registration of odd landing hall calls.

It is yet another preferred feature of this invention to prevent the registration of odd landing car calls in the upper compartment of a car which stops at a particular landing having said even and odd landing hall call registration devices with its upper compartment in response to even landing hall calls while this car is so stopped and to prevent the registration of even landing car calls in the lower compartment of a car which stops at that particular landing with its lower compartment in response to odd landing hall calls while it is so stopped.

The disclosed system attempts to keep two cars parked with their compartments adjacent the upper and lower lobbies for serving intending passengers thereat. Moreover the system is arranged to attempt to keep at these lobbies one car whose lower compartment serves a particular intermediate landing to which restricted service is extended and one car whose upper compartment serves this particular landing. In the system disclosed hereinafter the intermediate landing to which restricted service is extended is the third landing and by parking cars at the lobbies in the foregoing manner, a car which can serve the third landing is provided at both lobbies for passengers who desire to travel from either lobby to the third landing.

One of the cars at the lobbies is selected as the next to leave. As a result provision is made for transferring selection in case the selected car is not capable of serving the third landing with that one of its compartments which is adjacent the lobby level at which a passenger desiring to travel to the third landing is located. In such circumstances the registration of a hall call at either of the lobbies without the subsequent registration of a car call in one of the compartments of the selected car within a predetermined period causes a selection transfer operation to select the other car parked at the lobbies.

In summary, therefore, this aspect of the present invention provides an elevator system having multicompartment cars with an arrangement which parks two cars at the lobbies, one of which serves a particular intermediate landing with its lower compartment and the other of which serves that particular landing with its upper compartment, which selects one of the lobby cars as the next to leave and which is capable of transferring selection from one car to another upon an indication that a passenger at one of the lobbies desires to travel to that particular intermediate landing and that the selected car does not serve that landing with that one of its compartments which is adjacent the landing at which the passenger is located.

With restricted service extended to a particular intermediate landing through the provision of odd and even landing hall call registration devices at that landing and service provided to that landing by the selected car at the lobbies, which can only answer either an odd or an even landing hall call, it is also desirable to transfer selection in case the selected car is not capable of answering a hall call registered at that particular intermediate landing.

In order that this invention might be more clearly understood, an exemplary embodiment thereof will now be described with reference to the accompanying drawings wherein:—

FIGURES 1, 2, 3, 4, 6, 7 and 8 are a schematic wiring diagram in straight line form of a plurality of elevator control circuits;

FIGURE 5 is a schematic wiring diagram of hall lantern circuits;

FIGURES 9 and 10 are schematic wiring diagrams of circuits of car call registration devices and associated control equipment;

FIGURES 11 and 14 are schematic wiring diagrams of circuits of hall call registration devices and associated control equipment;

FIGURES 12, 13, 15 and 16 are schematic wiring diagrams of circuits employed in conjunction with the circuits of Figures 11 and 14; and

FIGURES 17 through 20 are key sheets in spindle form for locating the coils and contacts of the switches shown in the other FIGURES of the drawings.

To simplify the disclosure only that part of an elevator control system necessary to enable those skilled in the art to practice the invention is described. It is to be understood, of course, that even that part of the system which is disclosed is more simplified than it would be if adapted to suit a commercial installation. While the description is directed to a four car group of two compartment elevator cars which operate under the control of a group supervisory system of the zoned type to serve ten landings 1 to 9 and T, portions of the subject matter disclosed are suitable for use with but a single multicompartment car. It is to be realized, however, that in practice the disclosed subject matter is most likely to be used in group supervisory systems which control pluralities of multicompartment cars.

In general, for purposes of simplification, only the coil circuits of switches which perform functions primarily individual to one of the four elevator cars and the coil circuits of switches which perform group functions are illustrated. Those skilled in the art understand that where equipment individual to one car is disclosed similar equipment is provided for each of the other three cars as well. Where considered necessary differentiation between the respective cars and their individual equipment is provided in the following description and in the drawing by appending the lower case letters "*a*", "*b*", "*c*" and "*d*", a different one for each car, to the reference characters for the disclosed equipment. Further to avoid possible confusion certain representative circuits for each of the four cars are illustrated. In the drawing these circuits are enclosed in dotted lines and bear the identifying characters "*a*", "*c*" and "*b*", "*d*". These differentiate those circuits which apply only to elevators "*a*" and "*c*" and elevators "*b*" and "*d*", respectively. In addition, some individual contacts in the drawing are similarly enclosed in dotted lines and bear the reference characters "*a*" and "*b*". These identify those pairs of contacts of a particular group switch which are used in coil circuits of switches individual to cars "*a*" and "*b*". Under these pairs are found the numbers of the corresponding contact pairs which are used in the corresponding circuits for the remaining cars. Each of the switches in the drawing is shown with its contacts in the condition they assume when the switch is unactuated.

The names of the electromagnetic switches disclosed and the reference characters identifying these switches and the contacts they operate are as follows:

Switches Performing Primarily Group Related Functions

BDTA	Dispatch Time Switch
DOP	Door Open Preference Switch
ELC	Excessive Lobby Car Switch
FUT	Up Timing Switch
GLA	First Lobby Selection Switch
GLB	Second Lobby Selection Switch
GLZ	Group Lobby Zone Switch
GUD	Group Up Dispatch Switch
3HLD	Odd Landing Down Hall Call Switch
3HLU	Odd Landing Up Hall Call Switch
3HUD	Even Landing Down Hall Call Switch
3HUU	Even Landing Up Hall Call Switch
ILC	Insufficient Lobby Car Switch
LLTR	Lower Lobby Timing Switch
LLTX	Auxiliary Lower Lobby Timing Switch
ULTR	Upper Lobby Timing Switch
ULTX	Auxiliary Upper Lobby Timing Switch
XELC	Auxiliary Excessive Lobby Car Switch
XLLT	Timed Lower Lobby Timing Switch
XULT	Timed Upper Lobby Timing Switch
YELC	Second Auxiliary Excessive Lobby Car Switch
YLLT	Second Timed Lower Lobby Timing Switch
YULT	Second Timed Upper Lobby Timing Switch

One of each of the above identified switches is provided for the entire group of four cars.

Switches Performing Functions Related Primarily To Individual Cars

ASR	Automatic Start Switch
CLZ	Car Lobby Zone Switch
CTL	Car To Lobby Switch
DRR	Down Direction Reversal Switch
DRRX	Auxiliary Down Direction Reversal Switch
3F	Third Landing Switch
4F	Fourth Landing Switch
9F	Ninth Landing Switch
HG	Car Call Above Switch
HJ	Call Above Switch
HJX	Hall Call Above Switch
HR	Reversal Switch
LCBS	Lower Car Call Stop Switch
LCPR	Lower Parking Switch
LDO	Lower Door Control Switch
LDOL	Lower Door Limit Switch
LFZS	Lower Restriction Release Switch
LG	Car Call Below Switch
LGH	Lower Door Close Limit Switch
LHS	Lower Hall Stop Switch
LHSY	Auxiliary Lower Hall Stop Switch (Cars "a" And "c" Only)
LJ	Call Below Switch
LJX	Hall Call Below Switch
LXDO	Lower Door Open Switch
ML	Main Landing Switch
MLU	Main Landing Up Switch
MLZ	Main Landing Zone Switch
NCPR	Non-Selective Door Switch
NT	Door Open Time Switch
RUN	Running Switch
SC	Selection Switch
SCT	Top Selection Switch
TF	Top Landing Switch
UCBS	Upper Car Call Stop Switch
UCPR	Upper Parking Switch
UDO	Upper Door Control Switch
UDOL	Upper Door Limit Switch
UFZS	Upper Restriction Release Switch
UGH	Upper Door Close Limit Switch
UHS	Upper Hall Stop Switch
UHSY	Auxiliary Upper Hall Stop Switch (Cars "b" And "d" Only)
ULJ	Upper and Lower Call Switch
URR	Up Direction Reversal Switch
URRX	Auxiliary Up Direction Reversal Switch
UXDO	Upper Door Open Switch

One of each of the above identified switches is provided for each of the cars in the four car group unless otherwise indicated.

Each of the foregoing switches has a single two lead coil except car lobby zone switch CLZ, reversal switch HR, lower hall stop switch LHS and upper hall stop switch UHS. Car lobby zone switch CLZ and reversal switch HR each have a single three lead coil. That portion of each of these coils in Figures 2 and 4 bearing the letter S above it is a set portion which when energized causes its associated switch to operate to its actuated condition. That portion of each of these coils bearing the letter R above it is a reset portion which when energized causes its associated switch to operate to the unactuated, or released, condition. Lower hall stop switch LHS and upper hall stop switch UHS each have two two-lead coils. That coil of each shown in Figures 12 and 15 is an operate coil which when energized causes its associated switch to operate to its actuated condition. That coil of each shown in Figure 1 is a hold coil which if energized when its associated switch is already in its actuated condition will maintain it in that condition.

In addition to the above switches certain contacts of other switches employed in the disclosed constructed elevator control system are also shown in the drawing. The coil circuits for these switches are not shown but an explanation of how these switches operate is given below and from this those skilled in the art will understand how these switches are connected in the disclosed system. The names of these switches and the reference characters by which they and their associated contacts are identified are:

ADV	Advanced Advancer Switch
H	Field And Brake Switch
PM	Pawl Magnet Switch
G1Z	First Zone Switch

Advanced advancer switch ADV is individual to each car and operates to its actuated condition when the advancer carriage of its associated cars selector starts to scan ahead for landings at which the car should stop to answer calls. It operates to its unactuated condition upon the car approaching within a predetermined distance of a landing at which the car is stopping.

Field and brake switch H individual to each car operates to its actuated condition to lift the brake of its associated car and permit the car to start moving and operates to its unactuated condition to stop the car and apply the brake.

Pawl magnet switch PM is also individual to each car. It operates to its actuated condition to permit the selector advancer carriage of its associated car to scan and operates to its unactuated condition to stop the advancer carriage at positions corresponding to landings at which the car should stop.

First zone switch G1Z is common to the group and performs a group related function in a group supervisory system of the zoned type such as that employed in the constructed embodiment disclosed herein. It operates to its actuated condition upon the location of a car in the zone immediately above the lobby zone and to its unactuated condition upon the absence of a car in that zone. Those skilled in the art understand these systems and a

further explanation is deemed unnecessary. Only one pair of contacts of first zone switch G1Z is shown in the drawings and it appears in Figure 11. It prevents cars in the lobby zone from responding to hall calls above this zone if the first zone switch G1Z is actuated.

Referring now to the drawings, in Figure 1, door zone switches DZ1 and DZ2 are connected in the circuits of the coils of upper door control switch UDO and lower door control switch LDO both of which form part of their corresponding car's door control means. The door zone switches are mechanically operated and are associated with the upper and lower compartments of their corresponding car. Each operates to close its contacts when its associated compartment is within a predetermined distance of a landing at which it is stopping. Upper and lower compartment gate limit switches UGS1, UGS2, LGS1 and LGS2 are also mechanically operated switches. Switches UGS1 and LGS1 operate to close their respective contacts upon the doors of the upper and lower compartments of their corresponding car opening to a position a predetermined distance from their fully closed positions. These switches operates to open their respective contacts upon their respective doors closing to this predetermined distance. Switches UGS2 and LGS2 in contrast operate to open their respective contacts when the upper and lower compartment doors of their associated car open to a different predetermined distance from their fully closed positions. The contacts of these switches close upon their respective doors closing to this second predetermined distance.

In Figure 2 automatic reversal contacts 2ARC and TARC form part of the direction establishing means. These contacts are mounted on the selector machine of their associated car at positions corresponding to the second and top landings. Automatic reversal brush ARB engages these contacts as the upper compartment of its associated car moves into registry with these landings. Knife switches KS3, KS4 and KS5 are manually operated switches which permit the operation of the system to be changed.

In Figure 3 knife switches KS1 and KS2 are also manually operated switches which permit the operation of the system to be changed.

In Figure 4 extra control contacts 2CEC, 3CEC, 4CEC, 9CEC and TCEC are mounted on their associated car's landing selector at positions corresponding to the second, third, fourth, ninth and top landings. Extra control brush CEB is mounted on the advancer carriage of its associated car's selector in a position to engage the foregoing contacts at a distance ahead of the position corresponding to the location of its associated car's upper compartment. Engagement occurs at a distance ahead corresponding to the distance at which it is desired to scan ahead of the car's upper compartment in search of calls for that compartment. When the car is stopping this brush is in registry with the position corresponding to the landing at which the upper compartment will stop. It remains in registry with this position until the advancer carriage starts to move again preparatory to car movement.

In Figure 5 up and down lantern contacts ULC and DLC are mounted on their associated car's landing selector at positions corresponding to each of the landings. Upper compartment up and down lantern brushes UULB and UDLB are mounted on the advancer carriage of their associated car's landing selector to engage their associated contacts 1ULC, etc. and 3DLC, etc. corresponding to a respective landing as that landing is being scanned in search of calls for the upper compartment to answer. Lower compartment up and down lantern brushes LULB and LDLB are mounted on the advancer carriage of their associated car's landing selector to engage their associated contacts corresponding to a respective landing as that landing is being scanned for the lower compartment.

Figures 6 and 7 include, among others, circuits for selecting the next car to leave the lobby landings and circuits for transferring selection when desired.

In Figure 8 insufficient lobby car switch ILC and excessive lobby car switch ELC are connected in bridge circuits. Insufficient lobby car switch ILC operates to its actuated condition whenever two or more of the resistors shown series connected with the contacts HR1a . . . etc. are inserted in its bridge through the engagement of contacts MLZ1a, etc. and HR1a, etc. It operates to its unactuated condition whenever less than two of these resistors are connected in the bridge. Excessive lobby car switch ELC operates to its actuated condition whenever three or more of these resistors are connected in its bridge circuit and operates to its unactuated condition whenever less than three resistors are so connected. Up timing switch FUT operates to release to its unactuated condition a predetermined period after all its input circuits through contacts ASR1*a*, etc. and SC1*a*, etc. are interrupted. Contacts YELC1 of second auxiliary excessive lobby car switch YELC decrease this time period when they operate to their engaged condition as shown.

Figures 9 and 10 each show a typical set of car call registration circuits of the well known touch button variety, four sets of which are employed in the disclosed four car group. A separate one as disclosed in Figure 9 is provided for each of cars "*a*" and "*c*" whereas a separate one as disclosed in Figure 10 is provided for each of cars "*b*" and "*d*".

Upper compartment car call stop contacts

UCAC2, etc., lower compartment car call stop contacts LCAC1, etc. constitute part of car call answering circuits of the car stopping means. These contacts and car call switches HCC2, etc. are mounted on their associated car's selector at positions corresponding to the landings for which they are provided. Hall call brush HCB forms part of car call responsive means. It is a two part cam. The upper non-conducting portion is mechanically connected to the lower conducting portion. Upper and lower compartment car call stop brushes UCAB and LCAB and hall call brush HCB are mounted on the advancer carriage of their associated car's selector. Brush UCAB and the upper portion of brush HCB engage their respective contacts and switches at a distance ahead of the position corresponding to the location of their associated car's upper compartment. This distance is determined by the distance at which it is desired to scan ahead of the car's upper compartment in search of landings at which stops are to be made in answer to car calls registered in that compartment. Correspondingly, brush LCAB and the lower portion of brush HCB operate in a similar manner with respect to the lower compartment of their associated car. When their associated car is stopping, brush UCAB and the upper portion of brush HCB are in registry with the position corresponding to the landing at which the upper compartment will stop while brush LCAB and the lower portion of brush HCB are in registry with the position corresponding to the landing at which the lower compartment will stop. These positions are maintained until the advancer carriage starts to move again preparatory to car movement.

Amplifiers UCE, LCE, LGE and HGE as is well known energize their associated switch coils with a half-wave rectified d.c. potential from the source along line AC1 (Figure 11, connection not shown) whenever a signal signifying the registration of a car call is applied to their respective inputs. The outputs of amplifiers UCE and LCE are fed back to extinguish tubes L1C, U2C, etc. whenever car calls associated with the tubes are cancelled. In each of Figures 9 and 10 the tubes U2C, U3C, etc. are enclosed in a box defined by dotted lines and identified by the letters UCBR. This distinguishes the upper compartment car call circuits of a car from its lower compartment car call circuits which includes tubes L1C, L3C, etc. These latter tubes are similarly enclosed in a box defined by dotted lines but identified by the letters LCBR. No tubes marked U1C are provided in any of the upper compartments nor are any tubes marked L2C or LTC provided in any of the lower compartments. In the disclosed constructed embodiment the upper compartments cannot serve the first, or lower lobby, landing and the lower compartments cannot serve the second, or upper lobby, landing or the top landing. The circuitry of these figures and its operation are both well known to those skilled in the art and for purposes of brevity are not explained in detail.

Figures 11, 12, 13, 14, 15 and 16 include landing call registration circuits of the well known touch button variety for registering up and down landing calls. Only those circuits for the first, second, third, fourth, eighth, ninth and top landings are shown. Those for the other landings are similar to that shown for the eighth landing and are connected in a similar manner. Up hall stop and down hall stop contacts UH1*a*, etc. and DH3*a*, etc. (Figure 11) for car "*a*" form part of that car's hall call answering circuits of its stopping means. These contacts are mounted on the selector of car "*a*" at positions corresponding to their associated landings, as are hall call above and below contacts HH1a, etc. and LH2a, etc. These latter contacts comprise part of the direction establishing means for car "*a*". Contacts similar to the foregoing are provided for each car. Except for the third landing up and down hall stop contacts UH3 and DH3, corresponding contacts of each car are interconnected as represented by the lines, terminating in arrows connected to the contacts for car "*a*" (Figure 11) and those for car "*b*" (Figure 14). Even landing up and down hall call registration circuits including tubes 3UU and 3UD (Figure 11) are connected to the third landing up and down hall stop contacts UH3 and DH3 of cars "*a*" and "*c*" only. Correspondingly, odd landing up and down hall call registration circuits including tubes 3LU and 3LD (Figure 14 are connected to the third landing up and down hall stop contacts UH3 and DH3 of cars "*b*" and "*d*" only. Unlike the registration circuits for the other landings those for the third landing are connected only to apply signals to the hall stop contacts to which they are connected and to cause the actuation of even and odd landing up and down hall call switches 3HUU, 3HUD, 3HLU and 3HLD.

Up and down hall stop brushes for the upper compartment UUHB and UDHB (Figures 12 and 15) and for the lower compartment LUHB and LDHB are illustrated twice, once in Figure 12 to represent this equipment for each of cars "*a*" and "*c*" and once in Figure 15 to represent this equipment for each of cars "*b*" and "*d*". Similarly up and down hall call brush ULHB, hall call above brush HHB, and hall call below brush LHB are also represented twice, once in Figure 13 and once in Figure 16. Upper compartment hall stop brushes UUHB and UDHB for all cars like extra control brush CEB (Figure 4), are mounted on the advancer carriage of their associated car's selector to engage up and

down hall stop contacts UH1, etc. and DH3, etc. Engagement occurs at a distance ahead of the position corresponding to the location of the car. This distance corresponds to that at which it is desired to scan ahead of the location of the car's upper compartment in search of calls for that compartment. Similarly lower compartment brushes LUHB and LDHB engage contacts UH1, etc. and DH3, etc. but these brushes scan ahead in search of calls for the lower compartment. Hall call above brush HHB and up and down hall call brush ULHB are mounted on the advancer carriage of their associated car's selector to engage contacts HH1, etc. and LH2, etc. as brushes UUHB and UDHB engage their associated contacts for a particular landing. Hall call below brush LHB is mounted on the advancer carriage of its associated car's selector to engage contacts LH2, etc. as brushes LUHB and LDHB engage their associated contacts for a particular landing. When their associated car is stopping each of brushes UUHB, UDHB, LUHB, LDHB, HHB, ULHB and LHB are in engagement with a contact associated with the landing at which their corresponding compartment is stopping. This engagement continues until the car's advancer carriage starts to move again preparatory to car movement. The operation of the circuits of Figures 11 through 16 are also well known and will not be further described in detail.

The "spindle sheet" diagrams of Figures 17 through 20 facilitate the location on the other figures of the drawing of the coils and contacts of the switches. The reference characters along the tops of the "spindle sheets" refer to the various switches employed in the system. The numerals in parenthesis next to the coil illustrations and the contact illustrations and numerical designations on the "spindle sheets" identify the figure of the drawing upon which an associated coil or pair of contacts appear. By placing the "spindle sheet" containing the switch whose coil or contact pair location is of interest in alignment with the figure identified in parenthesis on the "spindle sheet", the desired location of the particular coil or contact pair will be found in the identified figure at the same vertical position as that occupied on the "spindle sheet" by that particular coil or contact pair.

Assume now that the control means of car "*a*" (not shown), which enable it to operate in a zoned system, is actuated such that car "*a*" is parked with its upper compartment adjacent the ninth landing and its lower compartment adjacent the eighth landing. Also assume that the doors of both its compartments are closed, and that its circuitry is conditioned so that the up direction of travel is established. In these circumstances reversal switch HR (coil circuit, Figure 2), which comprises another part of the direction establishing means, is in its actuated condition. Assume that a down hall call is registered at the ninth landing and no other calls are in registration. The registration of the call applies a signal through contact LH9*a* (Figure 11) and brush ULHBa (Figure 13) to cause the conduction of silicon controlled rectifier SCR5*a* and the actuation of upper and lower call switch ULJ*a*. This closes contacts ULJ1a (Figure 2) in the circuit of the coil of down direction reversal switch DRR*a*. Condenser QDR*a* provides a slight time delay, in the order of a half second, to the operation of switch DRR*a*. After this delay, contacts DRR5*a* and DRR6*a* (Figure 12) open to prevent the energization of the coils of lower and upper hall stop switches LHS*a* and UHS*a*. This precludes the answering of a hall call by either compartment once a reversal operation has begun until the reversal operation is completed. Simultaneously contacts DRR4*a* (Figure 2) closes to cause the actuation of auxiliary down direction reversal switch DRRXa. This closes contacts DRRX1*a* (Figure 2) and completes the circuit to the reset coil of reversal switch HR*a*. As a result switch HRa assumes its unactuated condition establishing the down direction as the preferred direction of travel. Contacts HR2*a* (Figure 2) open to release switch DRR*a*. This closes contacts DRR5a and DRR6a (Figure 12). Contacts HR19*a* (Figure 12) close to permit the conduction of silicon controlled rectifier SCR1a and the actuation of upper hall stop switch UHSa. Contacts UHS1*a* (Figure 1) close to cause the actuation of upper door open switch UXDO*a*. Contacts UXDO3*a* (Figure 12) close to provide a cancellation circuit for the ninth landing down hall call. In the meantime, a circuit has been completed for the hold coil of upper hall stop switch UHS*a* (Figure 1) through contacts PM2*a*, UDOL1*a* and UHS2*a*. Contacts UHS7*a* (Figure 2) are closed causing the actuation of upper restriction release switch UFZS*a*. Contacts UHS3a (Figure 1) are closed causing the actuation of upper parking switch UCPR*a*. As a result contacts UCPR1a (Figure 1) close to cause the actuation of upper door control switch UDO*a* to cause the doors to open and permit the intending passenger to enter. As the doors open upper compartment gate close limit switch UGS1a (Figure 1) closes its contacts to cause the actuation of upper door close limit switch UGH*a*. This closes contacts UGH3*a* (Figure 5) which in conjunction with already closed contacts UFZS2*a* provides a circuit from transformer TRa through contacts HR15*a* brush UDLBa and contact 9DLCa to light the ninth landing down hall lantern.

Contacts UXDO1*a* (Figure 1) maintain upper parking switch UCPRa in its actuated condition for the time delay provided switch UXDO*a* (coil circuit, Figure 1) by

the circuit of resistor RUX*a* and condenser QUX*a*. This maintains the doors of the upper compartment open for a predetermined time during which the contacts of upper door close limit switch UGS1a (Figure 1) maintain upper door close limit switch UGHa in its actuated condition. Contacts UGH2*a* (Figure 2) while separated prevent a direction reversal.

A passenger entering the upper compartment and registering a car call for a landing below the ninth landing during the time contacts UGH2*a* are separated causes car call below switch LG*a* (coil circuit, Figure 9) to operate to its actuated condition. This closes contacts LG1a (Figure 3) to cause call below switch LJ*a* to operate to its actuated condition. Contacts LJ1*a* (Figure 2) open to prevent an up hall call which may become registered at the eighth or ninth landing from initiating a direction reversal after the doors close. In addition, contacts LJ3*a* (Figure 2) open in the set coil circuit of reversal switch HR*a* to maintain the down direction as the preferred direction of travel.

If a passenger does not enter the car to register a car call below the ninth landing, the closing of the doors after the delay provided by upper door open switch UXDO*a* opens the contacts of switch UGS1*a*. This releases switch UGH*a* which closes contacts UGH2*a* to prepare a circuit for the coil of up direction reversal switch URRa and a circuit for the set coil of reversal switch HR*a*. Thereafter an up hall call registered at the ninth landing causes silicon controlled rectifier SCR3a (Figure 13) to conduct to operate hall call above switch HJXa to its actuated condition. This closes contacts HJX1a (Figure 3) and causes call above switch HJa to operate to its actuated condition. Contacts HJ2*a* (Figure 2) close to energize the set coil of reversal switch HR*a* which re-establishes the up direction as the preferred direction of travel. Consequently, contacts HR17*a* (Figure 12) close to cause the re-actuation of upper hall stop switch UHS*a*. As a result the doors of the upper compartment would again open in the manner previously described. This time, however, since contact HR14*a* (Figure 5) are closed the ninth landing up hall lantern would be lighted.

Now assume subsequent to the answering of the ninth landing down hall call that an up hall call is registered at the eighth landing. Also assume this occurs after the time delay provided by upper door open switch UXDO*a* elapses and that it occurs without the previous registration of a call below. This causes the actuation of upper and lower call switch ULJ*a* in the manner previously described. Contacts ULJ1*a* (Figure 2) close and with contacts HR3*a* (Figure 2) also closed result in the actuation of up direction reversal switch URR*a*. Contacts URR5*a* and URR6*a* (Figure 12) open to prevent the actuation of upper and lower hall stop switches UHS*a* and LHS*a*. Contacts URR4*a* (Figure 2) close to cause the actuation of auxiliary up direction reversal switch URRXa. This closes contacts URRX1*a* (Figure 2) to cause the actuation of reversal switch HR*a* which establishes the up direction as the preferred direction of travel. Consequently contacts HR3*a* (Figure 2) open to release switch URR*a* which operates to close contacts URR5*a* and URR6*a*. Contacts HR16*a* (Figure 12) close to permit the signal on up hall stop contact UH8a to cause the actuation of lower hall stop switch LHS*a*. In the manner similar to the manner in which up hall stop switch UHSa caused the opening of the upper compartment doors the actuation of lower hall stop switch LHS*a* causes the opening of the lower compartment doors. Similarly the actuation of switch LHSa causes the lighting of the eighth landing up hall lantern as the actuation of switch UHS*a* caused the lighting of the ninth landing up or down hall lantern.

Assume now that a down hall call is registered at the eighth landing after the elapse of the time delay which was provided by switch UXDO*a* in response to the answering of the ninth landing down hall call. Also assume that this occurs without the previous registration of a call below. Switch HRa is in its released condition and contacts HR18*a* (Figure 12) are closed. Thus the signal applied to contacts DH8*a* (Figure 11) owing to the registration of the call causes the immediate actuation of switch LHS*a* which, as mentioned, causes the lower compartment doors to open. This, in turn, as should be evident, causes the eighth landing down hall lantern to be lighted. In addition, contacts LHS9a immediately separate preventing the actuation of switch URRa. Thus the initiation of the answering of a hall call for the established direction of travel by one of the compartments precludes a reversal operation just as the initiation of a reversal operation precludes the answering of a hall call by either compartment.

Thus, it can be seen that the answering of a hall call for one direction of travel by one compartment, operates call answering delaying circuits which delay for at least a predetermined period of time (provided by switch UXDO or LXDO) the answering by the other compartment of a hall call for the other direction of travel registered at the landing at which the other compartment is located. Also it can be seen that before a hall call can be answered a direction of travel associated with that indicated by the call is established. Thus, reversal switch HR must be set to its actuated condition before an up hall call can be answered and it must be

reset to its unactuated, or released, condition before a down hall call can be answered.

In addition, without describing in detail the entire circuit operations it should be evident from the foregoing and from the similarity of the circuits that the arrangement disclosed enables a parked car to remain at rest and answer any hall call registered at any landing adjacent which one of its compartments is located.

In order to consider now the restricted service operation, assume car "*a*" is located with its upper and lower compartments at the upper and lower lobbies respectively. In these circumstances car lobby zone switch CLZ*a* (coil circuit, Figure 4) is in its actuated condition. Its set coil was energized through the circuit including brush CEB*a*, contact 4CEC*a*, contacts PM7*a* and HR9*a* as the car traveled past the fourth landing in the down direction. As the upper compartment of the car became located adjacent the upper lobby, if direction was not reversed already, brush ARB*a* engaged contact 2ARCa and energized the set coil of reversal switch HR*a* to operate the switch to its actuated condition and establish the up direction as the preferred direction of travel. The actuation of switch HRa opened contacts HR22*a* (Figure 2) which in conjunction with open contacts CLZ1*a* maintain upper and lower restriction release switch UFZS*a* and LFZS*a* in their released conditions. As a result, the car call registration prevention means of car "*a*" including contacts UFZS3*a* and LFZS3*a* (Figure 9) is operated. This prevents the registration of car calls for the fifth, seventh and ninth landings in the upper compartment of car "*a*" and the registration of car calls for the third, fourth, sixth and eighth landings in its lower compartment. It will be recalled from previous discussion that the car call registration circuits provided for car "*c*" are identical to those of car "*a*". The restricted service operation of car "*c*", therefore, is the same as that of car "*a*". A car call for the third landing is registerable in the upper compartments of cars "*a*" and "*c*" and not in their lower compartments during restricted service because, as will be described, these cars serve the third landing from the lobbies only with their upper compartments. Contrastingly from observation of Figure 10 it can be seen that when cars "*b*" and "*d*" are at the lobbies car calls for the third landing are not registerable in the upper compartments of these cars but are registerable in their lower compartments. This follows from the fact that cars "*b*" and "*d*" serve the third landing from the lobbies only with their lower compartments. As to the other landings, both the "odd" ones, 5, 7 and 9, as well as the "even" ones, 4, 6 and 8, service to these landings by cars "*b*" and "*d*" is restricted in the same way as in cars "*a*" and "*c*" by the prevention of the registration of car calls for such landings in the upper and lower compartments, respectively.

Restriction in the registration of predetermined car calls in both compartments of each of the cars continues at least until the upper compartment of the respective car travels up past the third landing. To understand this operation, assume that car "*a*" is traveling up from the lobbies and that its upper compartment is approaching the fourth landing. Its brush CEB*a* (Figure 4) emerges contact 4CEC*a* to cause the actuation of fourth landing switch 4F*a*. This closes contacts 4F7*a* (Figure 4) to energize the reset coil of car lobby zone switch CLZ*a* and cause its operation to its unactuated condition. Contacts CLZ1*a* (Figure 2) close to prepare circuits for the coils of upper and lower restriction release switches UFZS*a* and LFZS*a*. Thereafter the answering of a hall call by the upper compartment causes the actuation of up hall stop switch UHS*a* (coil circuit, Figure 12) in the previously described manner. This closes contacts UHS7*a* (Figure 2) and completes the circuit for the actuation of upper restriction release switch UFZS*a*. Contacts UFZS1*a* (Figure 2) close and maintain switch UFZS*a* actuated through contacts CLZ1*a*. Contacts UFZS3a (Figure 9) close and enable a passenger thereafter entering the upper compartment of car "*a*" to register a car call for any landing.

Likewise the answering of a hall call by the lower compartment of car "*a*" causes the actuation of lower hall stop switch LHS*a* (coil circuit, Figure 12) in the previously described manner. If contacts 4F8*a* (Figure 2) are closed the actuation of switch LHS*a* and the subsequent closing of contacts LHS7*a* (Figure 2) causes the actuation of lower restriction release switch LFZS*a*. This switch is maintained in this condition through its own contacts LFZS1a and contacts CLZ1*a*. Contacts LFZS3*a* (Figure 9) close and enable a passenger thereafter entering the lower compartment to register a car call for any landing.

Contacts 4F8*a* (Figure 2) prevent switch LFZSa from being actuated through contacts LHS7*a* while the upper compartment of car "*a*" is located adjacent the fourth landing. These contacts, therefore, prevent the release of the restriction in the lower compartment before that compartment travels above the third landing. This is of no consequence as far as car "*a*", and car "*c*" for that matter, are concerned since neither can serve the third landing in the up direction with its lower compartment but is essential on cars "*b*" and "*d*" which serve the third landing in the up direction only with their lower compartments.

Knife switch KS5 (Figure 2) when closed changes the foregoing operation. With one

exception mentioned below it releases restriction on both compartments of its associated car when either answers a hall call above the third landing. It accomplishes this by completing circuits to the coils of switches UFZS and LFZS when either contacts UHS7 or LHS7 are closed. Contacts 4F8, of course, still prevent the release of restriction in the lower compartment of their associated car when it is located at the third landing.

Knife switches KS3 and KS4 also permit changes in the foregoing operations. Knife switch KS3 when closed completes the circuit to the coil of switch UFZS to release the restriction of the upper compartment of its associated car whenever contacts H5 close. This, of course, occurs when the car stops in response to a car call as well as when it stops in response to a hall call. Similarly knife switch KS4 when closed completes the circuit to the coil of switch LFZS to release the restriction of the lower compartment of its associated car whenever contacts H6 close.

Contacts HR22 in the circuits of the coils of switches UFZS and LFZS release restriction in both compartments of their associated car when reversal switch HR is reset to its unactuated condition to establish the down direction as the preferred direction of travel.

The changes in operation provided by knife switches KS3, KS4 and KS5 may be desirable in conjunction with the changes in operation provided by knife switches KS1 and KS2 (Figure 3). Knife switch KS2 when closed enables both the upper and lower compartment doors of a car to open when only one of its compartments is answering a car or hall call. Contacts 3F5 are provided on each of the cars to prevent this operation if the upper compartment of the car is located adjacent the third landing. It is not desirable in the disclosed constructed embodiment to open the lower compartment doors of any of the cars when the lower compartment is located at the second, or upper lobby, landing. Contacts 4F3 are provided on cars "*a*" and "*c*" to prevent the foregoing operation if the upper compartment of either of these cars is located adjacent the fourth landing and the up direction of travel is established for the car (contacts HR8 open). It is not desirable to open the lower compartment doors on cars "*a*" and "*c*" when those compartments are located adjacent the third landing and the car is prepared for up travel.

To understand how the doors of both compartments of a car are opened when only one of them is answering a car or hall call, assume knife switches KS1 and KS2 of one of the cars are both closed. Answering a car or hall call with its upper compartment actuates the car's upper car call switch UCBS (coil circuit, Figures 9 or 10) or its upper hall stop switch UHS (coil circuit, Figure 12 or 15). This closes contacts UCBS1 or UHS3 (Figure 1) and actuates the car's upper parking switch UCPR. Answering a car or hall call with its lower compartment actuates the car's lower car call stop switch LCBS (coil circuit, Figure 9 or 10) or its lower hall stop switch LHS (coil circuit, Figure 12 or 15). This closes contacts LCBS1 or LHS3 (Figure 1) and actuates the car's lower parking switch LCPR. In closing in response to the actuation of their respective switches contacts UCPR4 and LCPR4 (Figure 3) complete a circuit for the car's non-selective door switch NCPR unless the combined door operation is otherwise prevented by contacts 3F5 or 4F3. Contacts NCPR1 and NCPR2 (Figure 1) engage to prepare circuits for the upper and lower door control switches UDO and LDO. These circuits are completed through contacts ADV1 and DZ1 and through contacts ADV2 and DZ2 respectively as the upper and lower compartments of the car approach within a predetermined distance of the landings at which they are stopping. Contacts NCPR3 and NCPR4 (Figure 5) engage to light the hall lanterns at the landings at which both compartments are stopping if the upper compartment is located adjacent the second landing (CLZ4 and CLZ5 closed) or if both restrictions have been released (UFZS2 and LFZS2 closed).

Knife switch KS1 when opened changes the operation so that the combined door operation is permitted only when a car is travelling down and its upper compartment is approaching the upper lobby landing and one of its compartments is answering either a car or hall call. In these circumstances, field and brake switch H (coil circuit not shown) is actuated closing contacts H8 and brush CEB (Figure 4) is engaging contact 2CEC to actuate main landing zoning switch MLZ. This closes contacts MLZ4 (Figure 3) to complete the circuit for the coil of switch NCPR. This actuates switch NCPR to produce the combined door operation in the previously described manner.

As previously mentioned restricted service may be extended to the third landing. In providing this odd and even landing up and down hall call registration devices are provided at that landing in the form of touch button tubes 3LU and 3LD (Figure 4) and 3UU and 3UD (Figure 11). To understand how these control the operation of the system assume all four cars are above the fourth landing and that car "*a*" is the lowest car. In these circumstances none of the car lobby zone switches CLZ (representative coil circuit in Figure 4) is actuated. Contacts CLZ3*a*, CLZ3*b*, CLZ3*c* and CLZ3*d* (Figure 4) are all separated and group lobby zone switch GLZ is in its released condition. Contacts GLZ1 (Figure 11) are closed to apply a signal to the LH4 selector contacts of each car. As is well known in the zoned type system of

the disclosed constructed embodiment this signal causes the actuation of hall call below switch LJX (representative coil circuits in Figures 13 and 16) of at least the lowest car. Thus, under the assumed conditions switch LJX*a* is actuated. This closes contacts LJX1a (Figure 3) to cause the actuation of call below switch LJ*a*. Contacts LJ2*a* (Figure 2) close and, if switch HR*a* is not already released, ultimately cause the energization of the reset coil of reversal switch HR*a* to cause its operation to its released condition establishing the down direction of travel for car "a". The operation of switch HR*a* in conjunction with the continued separation of contacts LJ4*a* (Figure 3) causes the release of automatic start switch ASR*a* of the car starting means with the result that car "*a*" starts moving in the down direction.

Car "*a*" continues travelling down until its upper compartment is located adjacent the fourth landing, and brush CEB*a* (Figure 4) engages contacts 4CECa to cause the energization of the set coil of car lobby zone switch CLZ*a* through contacts PM7*a* and HR9*a*. This causes contacts CLZ3*a* (Figure 4) to engage to cause the actuation of group lobby zone switch GLZ. Contacts GLZ1 (Figure 11) separate and switch LJX*a* can operate to open its contacts LJX1a (Figure 3) to cause the release of switch LJ*a*, however, contacts CLZ6*a* (Figure 9) close. Assuming neither a car nor a hall call is registered above car "*a*" to which it can respond contacts HJ6a (Figure 9) are also closed to cause the actuation of lower car call switch LG*a*. This closes contacts LG1a (Figure 3) to maintain switch LJ*a* in its actuated condition. In this way car "*a*" continues traveling down until it stops with its upper and lower compartments adjacent the upper and lower lobbies, respectively.

As car "*a*" approaches the lobbies the upper, non-conducting portion of brush HCBa engages switch HCC2*a*. This releases switch LG*a* to open contacts LG1*a* (Figure 3). In opening these contacts release switch LJ which closes contacts LJ3*a* (Figure 2). As a result the set coil of reversal switch HR*a* is energized through contacts RUN3a, PM5a, UHS5a, LJ3*a* and DRR3*a*. This operates switch HR*a* to its actuated condition. In addition, brush CEB*a* (Figure 4) engages contact 2CECa to cause the actuation of main landing zone switch MLZ*a*. This closes contacts MLZ1*a* (Figure 8). Both excessive lobby car switch ELC and insufficient lobby car switch ILC, however, remain in their released conditions because only one circuit is completed through contacts MLZ1*a* and HR1*a* and as explained these switches require the completion of at least three or at least two of these circuits, respectively, in order to be operated. The actuation of switch MLZ*a* and the engagement of contacts MLZ5*a*, therefore causes the actuation of second lobby selection switch GLB (coil circuit, Figure 7) through the circuit including contacts ILC1, MLZ5*a*, GLA3 and XELC1.

Since neither car "*b*" nor car "*d*" is located at the lobbies a circuit is completed for the coil of one of their top selection switches SCT (Figure 6) through contacts ML1b or ML1d. Assume this circuit is completed for the coil of switch SCT*b* so that contacts SCT1*b* (Figure 2) are closed. These contacts in conjunction with closed contacts GLB1 (Figure 2) cause the actuation of car to lobby switch CTLb. Contacts CTL1*b* (Figure 10) apply a signal to switch HCC2*b* to cause the actuation of switch LG*b*. This closes contacts LG1*b* (Figure 3) to cause the actuation of switch LJ*b*. Ultimately as mentioned in connection with car "*a*" this causes car "*b*" to start to travel down. Once started down it continues to travel in that direction in response to the signal applied through contacts CTL1*b* until it becomes located with its upper and lower compartments adjacent the upper and lower lobby landings, respectively. Upon arrival its switches HRb and MLZ*b* are actuated in the manner described for car "*a*". This causes switch ILC (coil circuit, Figure 8) to operate to its actuated condition which opens contacts ILC1 (Figure 7) to release switch GLB.

Notwithstanding car "*a*", which as will be explained answers only even landing hall calls registered at the third landing and only with its upper compartment, might be joined at the lobbies by car "*c*", which also answers only even landing hall calls registered at the third landing and only with its upper compartment, car "*b*", which answers odd landing hall calls registered at the third landing with its lower compartment, will continue to travel down to the lobbies to provide service thereat. Although the arrival of car "*c*" at the lobbies actuates switch ILC to open contacts ILC1 in the circuit of the coil of switch GLB in the same manner as explained for car "*b*" a circuit for the coil for switch GLB is maintained through contacts MLU5*a* and MLU5*c*. Each of switches MLU*a* and MLU*c* (representative coil circuit in Figure 4) is operated to its actuated condition through a circuit including its respective brush CEB, selector contact 2CEC and contacts HR11 and PM9 as its respective car reverses its established direction of travel to up in the manner explained for car "*a*".

Upon the arrival of car "*b*" at the lobbies three cars are located thereat. One of them as will be explained is selected as the next to leave and as such has its selection switch SC (coil circuits, Figure 6) actuated. The presence of three cars at the lobbies also causes the actuation of excessive lobby car switch ELC (coil circuit, Figure 8). Contacts ELC2 (Figure 8) in closing actuate second

auxiliary excessive lobby car switch YELC. This closes contacts YELC2 (Figure 11) which apply a signal to contacts HH3 of each of the cars. This signal causes the actuation of switch HJX (coil circuit, Figure 13 or 16) of each of the cars located adjacent the lobbies. Contacts HJX1 (Figure 3) of each car in closing actuate their associated switch HJ. The actuation of switch HJ of the selected car at the lobbies as will be explained causes the dispatch of that car so that only two cars are left at the lobbies.

From the foregoing and from the symmetry of the circuits for the coils of switches GLA and GLB it is evident that the system is arranged to provide two cars at the lobbies at all times, one which serves the third landing with its upper compartment and answers even landing hall calls registered thereat and one which serves the third landing with its lower compartment and answers odd landing hall calls registered thereat.

Assume now that cars "*a*" and "*b*" are located with their upper and lower compartments adjacent the upper and lower lobbies. In these circumstances one of the cars is selected as the next to leave and as such has its selection switch SC (coil circuits, Figure 6) actuated. Assume car "*a*" has arrived first and is selected. As the advancer carriage of its selector approached the position corresponding to the lobbies the established direction of travel for the car was reversed in the previously described manner. The arrival of the car actuated switch MLU*a* as previously described. This closed contacts MLU3*a* (Figure 6) in the circuit of the coil of switch SC*a*. At that time lower lobby timing switch LLTR (coil circuit, Figure 7) was actuated through closed contacts LHSY1a, LHSY1c, 3LHU1 and 3LHD1. Contacts LLTR1 (Figure 7) were closed and timed lower lobby timing switch XLLT was actuated. This closed contacts XLLT1 (Figure 6) in the circuit of the coil of switch SC*a*. Since no other car was located at the lobbies when car "*a*" arrived and neither of the doors of car "*a*" were opened at that time, door open preference switch DOP (coil circuit, Figure 7) was in its released condition and contacts DOP1 (Figure 6) were closed to complete the circuit for the coil of switch SCa to select car "*a*" as the next to leave.

As car "*a*" arrived at the lobbies automatic start switch ASR*a* (coil circuit, Figure 3) was actuated through closed contacts NT3*a*. After the time delay of door open timed switch NT*a* elapses switch ASR*a* is maintained in its actuated condition through closed contacts HG1*a*, TF3*a*, GUD1, MLU2*a* and ASR4*a* provided no car call exists in car "*a*" and a dispatching signal has not been generated for it.

Contacts SC3*a* and ASR5*a* complete the circuit for the coil of non-selective door switch NCPR*a*. In operating to its actuated condition switch NCPR*a* closed contacts NCPR1*a* and NCPR2*a* (Figure 1). In the previously described manner, these caused the actuation of upper and lower door control switches UDO*a* and LDO*a* respectively, which results in the opening of both the upper and the lower compartment doors of car "*a*".

Assume now that while selected car "*a*" and car "*b*" are located at the lobbies, an odd landing up hall call is registered at the third landing. This causes touch button tube 3LU (Figure 14) to conduct and apply a signal to contacts UH3 of elevators "*b*" and "*d*". This signal also causes the actuation of odd landing up hall call switch 3HLU (coil circuit, Figure 14). Neither car "*a*", the selected car, nor car "*c*" for that matter if it was at the lobbies, can answer this call since it does not apply a signal to their UH3 contacts (Figure 11).

Contacts 3HLU2 (Figure 10) close to apply a signal through closed contacts CLZ6*b* and the series HCC*b* contacts to cause the actuation of car call above switch HG*b*. Contacts HG2*b* (Figure 3) close to cause the actuation of call above switch HJb without effect at this time. Contacts 3HLU1 (Figure 7) open to permit the release of switch LLTR after its 15 second time delay provided by the circuit including resistor RLL and condenser QLL. After the elapse of this period contacts LLTR4 (Figure 7) close to actuate dispatch time switch BDTA. Contacts LLTR1 (Figure 7) open to release switch XLLT after a time delay in the order of 3/4 of a second provided by the circuit including resistor RXL and condenser QXL. Contacts XLLT3 (Figure 7) engage to reactuate switch LLTR. Contacts LLTR4 open to interrupt the circuit for the coil of switch BDTA whose release is delayed for a time period of approximately 10 seconds by the circuit including resistor RBD and condenser QBD. Contacts LLTR1 close to re-establish the circuit for the coil of switch XLLT but the actuation of this switch is delayed for approximately 1/4 second by the circuit including resistor RXT2 and condenser QXL. During the time switch XLLT is in its unactuated or released condition contacts XLLT1 (Figure 6) are separated and release switch SCa. This releases the selection of car "*a*". Contacts SC4*a* (Figure 6) close to cause the actuation of switch SC*b*, which forms part of the selection means for car "*b*", through contacts BDTA6, MLU3*b*, XULT1, SC5*c* and SC5*d*. As a result selection has been transferred from car "*a*" to car "*b*".

If up timing switch FUT (coil circuit, Figure 8) has previously released, group up dispatch switch GUD (coil circuit, Figure 8) is actuated through contacts SC6*b*, HJ5*b* and ASR6*b* (switch ASR*b* having been actuated in

a manner similar to that explained for car "*a*"). If switch FUT has not yet released, switch GUD is actuated when the time delay of switch FUT elapses. Contacts GUD2 (Figure 3) separate to permit switch ASR*b* to release after its 1/2 second time delay provided by the circuit including resistor RSR and QSR. The release of switch ASRb starts car "*b*" upward in response to the signal applied to switch HCC5*b* (Figure 10) in the well known manner.

In travelling up brush UUHB*b* engages contact UH3*b* without effect since the upper compartment of car "*b*" like that of car "*d*" is prevented from stopping at the third landing in response to the odd landing up hall call registered thereat. This is accomplished through a stop prevention means including contacts 3F8*b* (Figure 15). These contacts are separated in the circuit of brush UUHB*b* when the upper compartment of car "*b*" is in a position to stop at the third landing because brush CEB*b* (Figure 4) is engaging contact 3CEC*b* and third landing switch 3F*b* is in its actuated condition. As a result, car "*b*" continues travelling upward until brush LUHB*b* engages contact UH3*b* causes the actuation of lower hall stop switch LHS*b* (coil circuit, Figure 15). This causes the rest of any suitable well known stopping means (not shown) to stop the car in answer to the odd landing up hall call with its lower compartment at the third landing. The closing of contacts LHS8*b* (Figure 15) causes the cancellation of the call through call cancellation means including contacts LXDO3*b*, HR21*b*, URR6*b*, DRR5*b*, 3F6*b*, MLU6*b*, HR16*b* and TF2*b* as the car prepares to open the doors of its lower compartment.

After stopping and opening its doors only odd landing car calls can be registered in car "*b*" because, as previously explained, the car call registration prevention means including switch LFZS*b* (coil circuit, Figure 2) remains unactuated by reason of contacts 4F8*b* being separated.

A similar selection transfer operation occurs if an even landing up hall call is registered at the third landing while car "*b*" or car "*d*" is selected and either car "*a*" or car "*c*" is also located at the lobbies. Under these circumstances, car "*a*" or car "*c*" answers the even landing up hall call with its upper compartment and only even landing car calls can be registered in it.

Observe that if a car call has been registered in car "*a*" when selection was transferred to car "*b*", car "*a*" would also have left the lobbies so that the passenger who registered the car call would not be delayed inordinately. During the selection transfer operation switch BDTA (coil circuit, Figure 7) is actuated for approximately 10 to 12 seconds owing primarily to its condenser time delay circuit including resistor RBD and condenser QBD. During this time switch NT*a* (coil circuit, Figure 1) having a time delay of approximately 3 to 4 seconds will release to open its contacts NT3*a* (Figure 3). The registration of the car call in car "*a*" and the consequent opening of contacts HG1*a*, therefore, will interrupt all circuits for the coil of switch ASRa (coil circuit, Figure 3). The time delay on switch ASR*a* being in the order of 1/2 second permits switch ASR*a* to release provided the separation of contacts HG1a owing to the registration of a car call in car "*a*" interrupts the coil circuit of switch ASR*a* more than 1/2 a second before switch BDTA releases to close contacts BDTA1. The release of switch ASR*a* starts car "*a*" in the up direction.

Assume now that cars "*a*" and "*b*" are again both located at the lobbies with car "*a*" selected and a hall call is registered at the lower lobby landing. Adjacent this landing is the lower compartment of car "*a*" which does not serve the third landing in the up direction. Assume also that the passenger who registered the hall call doesn't register a car call in car "*a*" and that no other car call is registered in car "*a*" in either of its compartments. The failure to register a car call by the passenger who registered the lower lobby hall call is an indication that he desires to travel to the third landing. (A sign at the lower lobby landing adjacent car "*a*" would, of course, be provided to inform the passenger not to enter the lower compartment of car "*a*" that it doesn't serve the third landing.) In these circumstances switch LHS*a* (coil circuit, Figure 12) is actuated by the signal applied to contact UH1*a* (Figure 11) by the lower lobby landing hall call tube 1U (Figure 11). Without a car call being in registration in car "*a*" contacts HG3*a* and contacts MLZ6*a* (Figure 12) are both separated. This prevents the cancellation of the hall call at the lower lobby landing. Contacts LHS6*a* (Figure 2) are engaged in the circuit of the coil of auxiliary lower hall stop switch LHSY*a* causing the actuation of that switch. Contacts LHSY1*a* (Figure 7) separate to permit the release of switch LLTR after its 15 second delay. The release of switch LLTR causes selection transfer to car "*b*" in the previously described manner. This provides the intending passenger at the lower lobby with a compartment which will serve the third landing; a sign adjacent car "*b*" being provided to inform him of this fact.

If during the foregoing selection transfer operation, a car call is registered in car "*a*" before the 15 second release time of switch LLTR elapses, contacts HG3*a* (Figure 12) close to enable the cancellation of the lower lobby hall call in the well known manner. This releases switches LHS*a* and LHSY*a*

to maintain switch LLTR actuated. As a result the selection transfer operation is discontinued and the intending passenger desiring to travel to the third landing is required to await the dispatch of car "*a*" before car "*b*" is selected to provide him with service. This precludes the dispatch of two cars without a dispatch interval between them.

A similar transfer operation transfers selection from car "*b*" or car "*d*" to car "*a*" or car "*c*" when either is located at the lobbies and an up hall call is registered at the upper lobby landing and a car call is not registered in the selected car within approximately 15 seconds.

Assume now the foregoing situation in which a selection transfer operation from car "*a*" to car "*b*" was attempted but rather than car "*b*" being located adjacent the lobbies where it could accept selection, it is located above the third landing as are cars "*c*" and "*d*". If this selection transfer attempt is the result of the registration of an odd landing hall call at the third landing the release of switch LLTR as described releases switch XLLT to release switch SC*a*. No other car is located adjacent the lobbies and, therefore, another selection switch SC cannot be actuated. Contacts XLLT3 (Figure 7) reactuates switch LLTR as previously described. Contacts LLTR1 in reclosing provide a circuit for the coil of switch XLLT which actuates after a 1/4 second time delay. This closes contacts XLLT1 (Figure 6) and reactuates switch SCa. Car "*a*" is, therefore, selected once again. The actuation of switch XLLT opens contacts XLLT3 to permit switch LLTR to once again release. This cycle is repeated about every 15 seconds until car "*a*" is dispatched or car "*b*" or "*d*" arrives at the lobbies to accept selection.

If the above selection transfer attempt is the result of the registration of a hall call at the lower lobby landing without the subsequent registration of a car call in car "*a*" an operation somewhat different from the foregoing occurs. The release of switch XLLT separates contacts XLLT4 (Figure 7) to release second timed lower lobby timing switch YLLT. Contacts YLLT2 (Figure 12) close to prepare a circuit for the cancellation of the hall call. At the same time contacts XLLT3 (Figure 7) close to cause the actuation of switch LLTR. Contacts LLTR1 then provide a circuit for switch XLLT. The actuation of switch XLLT is delayed, however, for 1/4 of a second. During this time contacts LLTR3 cause the actuation of switch LLTX which closes its contacts LLTX1 (Figure 12). In closing, these contacts complete a cancellation circuit for the hall call at the lower lobby landing. Thus, such a call if re-registered is cancelled during each cycle of the selection transfer operation notwithstanding no one registers a car call in car "*a*".

As mentioned, car "*b*" is prevented from stopping with its upper compartment at the third landing in response to an odd landing up hall call registered thereat. Since the circuitry for car "*d*" is identical to that of car "*b*" it also is prevented from so stopping. Further, because an even landing up hall call does not apply a signal to the UH3 contacts of cars "*b*" and "*d*", cars "*b*" and "*d*" are incapable of stopping with either compartment at the third landing in response to an even landing up hall call registered thereat, just as cars "*a*" and "*c*" are incapable of stopping in response to an odd landing up hall call registered at the third landing. Finally, cars "*b*" and "*d*" are totally incapable of serving the third landing with their upper compartments while travelling up since a car call for that landing cannot be registered until the restricted service operation is released. This cannot occur until the upper compartment is effectively above the third landing. Cars "*b*" and "*d*" are permitted to stop with their upper compartments at the third landing while travelling down. If so stopped, however, contacts 3F3*b* and 3F3*d* (Figure 3) in the circuits of the coils of their respective call below switches LJ*b* and LJ*d* maintain such switches actuated. This maintains switch HR (coil circuit, Figure 2) of each car in its released condition and prevents a reversal to establish the up direction as the preferred direction of travel.

Correspondingly, cars "*a*" and "*c*" are prevented from or incapable of stopping with their lower compartments at the third landing in response to an even or an odd landing up hall call registered thereat. Contacts 4F6 (Figure 12) of each car are separated when the lower compartment of the respective car is approaching the third landing and while it is located thereat. These contacts comprise a stop prevention means individual to each of cars "*a*" and "*c*" which prevents the lower compartment of each car from answering an even landing up hall call. The non-application of the signals produced by a registered odd landing up hall call to contacts UH3*a* and UH3*c* of cars "*a*" and "*c*" render them incapable of answering such a call. In addition, restricted service operation prevents a third landing car call from being registered in the lower compartment of either car "*a*" or car "*c*" while it is traveling up. Consequently, these cars are totally incapable of serving the third landing with their lower compartments while traveling in the up direction. They are permitted, however, to stop with their lower compartments at this landing when traveling down. If so stopped, they are prevented from reversing to establish the up direction as the preferred direction of travel by the presence of the 4F2*a* and 4F2*c* con-

tacts (Figure 2) in the circuits of the coils of their respective call below switches LJa and LJc.

Contacts HR20 and HR21 (Figures 12 and 15) of each car provide an operation in which the lower compartment of each car preferably stops in answer to up hall calls while its respective car is moving in the up direction and in which the upper compartment of each car preferably stops in answer to down hall calls while its respective car is moving in the down direction.

Contacts TF2 (Figures 12 and 15) of each car are closed when the upper compartment of their associated car is located at the top terminal landing. These are provided in the disclosed constructed embodiment to prevent the lower compartments of the cars from answering up hall calls at the landing adjacent the top terminal landing, the ninth landing as disclosed herein. No runby is provided above the top terminal landing in the constructed embodiment and so the lower compartments of the cars cannot serve the top terminal landing. Contacts 9F1 (Figures 12 and 15) of each car are closed when the upper compartment of their respective car is in position to stop at the ninth landing. These are provided for each car to permit the upper compartments to stop in answer to up hall calls at the ninth landing and override the preference provided by contacts HR20 and HR21 for stopping the lower compartments in answer to up hall calls.

Contacts TF3 (Figure 3) of each car are separated when the upper compartment of their associated car is located adjacent the top terminal landing. These are provided to prevent the cars from parking in this position with their lower compartments adjacent the ninth landing since the lower compartments cannot answer up hall calls at that landing.

Contacts 3F6 (Figures 12 and 15) of each car are separated when the upper compartment of their respective car is in position to stop or is stopped at the third landing. These are provided in the disclosed constructed embodiment so that when any of the cars is in this position and its lower compartment is adjacent the second landing, it is prevented not only from stopping in response to but also from cancelling a hall call at that landing. As mentioned previously, it is not desirable in this embodiment to permit the lower compartments to answer hall calls at the second landing.

Contacts 3F7 (Figure 12) of cars "*a*" and "*c*" are closed when the upper compartment of their associated car is in position to stop or is stopped at the third landing. These permit the upper compartments to stop in answer to even landing up hall calls at the third landing and also override the preference provided by contacts HR20 and HR21 for stopping the lower compartments in answer to up hall calls.

Contacts 3F4 (Figure 3) of cars "*b*" and "*d*" are closed when the upper compartment of their associated car is in position to stop or is stopped at the third landing. These maintain the up direction as the preferred direction of travel for their associated cars and prevent them from undergoing a direction reversal operation from the up direction to the down until their upper compartments are located above the third landing. They prevent the upper compartments of cars "*b*" and "*d*" from stopping at the third landing as the result of a direction reversal operation when a third landing hall or car call is the highest call to which the cars are responding.

Contacts 4F5 (Figure 5) of cars "*b*" and "*d*" are closed when the upper compartment of their associated car is in position to stop or is stopped at the fourth landing. They permit the up hall lanterns of these cars to be lighted when the cars are prepared for up travel and are answering hall calls at the fourth landing with their upper compartments or odd landing up hall calls at the third landing with their lower compartments.

In the constructed embodiment, as disclosed, both odd and even landing down hall call registration devices are provided at the third landing. Those skilled in the art will understand that, in contrast to this, one or more down hall call registration devices for registering desired travel to any landing below could have been provided at the third landing as desired. In the event that one or more common devices is provided only one third landing down hall call could be registered and all cars would be capable of stopping for this call in the well known manner. Also any one of the cars selected at the lobbies would be started in the up direction in response to this call whereas in the disclosed embodiment response to odd and even landing down hall calls by selected cars is similar to that described for odd and even landing up hall calls.

Various modifications to the above described system are possible without departing in any way from the scope of the invention as defined by the appended claims. It is intended, therefore, that the constructed embodiment specifically described not be considered exclusive or limiting, but be considered as exemplifying the invention.

WHAT WE CLAIM IS:—

1. An elevator system including, an elevator car having upper and lower passenger compartments operable to serve a plurality of intermediate landings and two terminal landings of a building in response to the registration of up and down hall calls at said landings, at least certain of said landings

tacts (Figure 2) in the circuits of the coils of their respective call below switches LJa and LJc.

Contacts HR20 and HR21 (Figures 12 and 15) of each car provide an operation in which the lower compartment of each car preferably stops in answer to up hall calls while its respective car is moving in the up direction and in which the upper compartment of each car preferably stops in answer to down hall calls while its respective car is moving in the down direction.

Contacts TF2 (Figures 12 and 15) of each car are closed when the upper compartment of their associated car is located at the top terminal landing. These are provided in the disclosed constructed embodiment to prevent the lower compartments of the cars from answering up hall calls at the landing adjacent the top terminal landing, the ninth landing as disclosed herein. No runby is provided above the top terminal landing in the constructed embodiment and so the lower compartments of the cars cannot serve the top terminal landing. Contacts 9F1 (Figures 12 and 15) of each car are closed when the upper compartment of their respective car is in position to stop at the ninth landing. These are provided for each car to permit the upper compartments to stop in answer to up hall calls at the ninth landing and override the preference provided by contacts HR20 and HR21 for stopping the lower compartments in answer to up hall calls.

Contacts TF3 (Figure 3) of each car are separated when the upper compartment of their associated car is located adjacent the top terminal landing. These are provided to prevent the cars from parking in this position with their lower compartments adjacent the ninth landing since the lower compartments cannot answer up hall calls at that landing.

Contacts 3F6 (Figures 12 and 15) of each car are separated when the upper compartment of their respective car is in position to stop or is stopped at the third landing. These are provided in the disclosed constructed embodiment so that when any of the cars is in this position and its lower compartment is adjacent the second landing, it is prevented not only from stopping in response to but also from cancelling a hall call at that landing. As mentioned previously, it is not desirable in this embodiment to permit the lower compartments to answer hall calls at the second landing.

Contacts 3F7 (Figure 12) of cars "*a*" and "*c*" are closed when the upper compartment of their associated car is in position to stop or is stopped at the third landing. These permit the upper compartments to stop in answer to even landing up hall calls at the third landing and also override the preference provided by contacts HR20 and HR21 for stopping the lower compartments in answer to up hall calls.

Contacts 3F4 (Figure 3) of cars "*b*" and "*d*" are closed when the upper compartment of their associated car is in position to stop or is stopped at the third landing. These maintain the up direction as the preferred direction of travel for their associated cars and prevent them from undergoing a direction reversal operation from the up direction to the down until their upper compartments are located above the third landing. They prevent the upper compartments of cars "*b*" and "*d*" from stopping at the third landing as the result of a direction reversal operation when a third landing hall or car call is the highest call to which the cars are responding.

Contacts 4F5 (Figure 5) of cars "*b*" and "*d*" are closed when the upper compartment of their associated car is in position to stop or is stopped at the fourth landing. They permit the up hall lanterns of these cars to be lighted when the cars are prepared for up travel and are answering hall calls at the fourth landing with their upper compartments or odd landing up hall calls at the third landing with their lower compartments.

In the constructed embodiment, as disclosed, both odd and even landing down hall call registration devices are provided at the third landing. Those skilled in the art will understand that, in contrast to this, one or more down hall call registration devices for registering desired travel to any landing below could have been provided at the third landing as desired. In the event that one or more common devices is provided only one third landing down hall call could be registered and all cars would be capable of stopping for this call in the well known manner. Also any one of the cars selected at the lobbies would be started in the up direction in response to this call whereas in the disclosed embodiment response to odd and even landing down hall calls by selected cars is similar to that described for odd and even landing up hall calls.

Various modifications to the above described system are possible without departing in any way from the scope of the invention as defined by the appended claims. It is intended, therefore, that the constructed embodiment specifically described not be considered exclusive or limiting, but be considered as exemplifying the invention.

WHAT WE CLAIM IS:—

1. An elevator system including, an elevator car having upper and lower passenger compartments operable to serve a plurality of intermediate landings and two terminal landings of a building in response to the registration of up and down hall calls at said landings, at least certain of said landings

being so separated as to enable the upper and lower passenger compartments to serve two adjacent landings simultaneously; control apparatus for causing said car to stop operating and for enabling it to remain at rest with its two passenger compartments located adjacent intermediate landings in the building provided no call is registered to which it can respond; hall call answering equipment operable to cause said car to answer a registered hall call; and call answering rely equipment, operable in response to the answering of a hall call for one direction of travel at a landing adjacent one of said two passenger compartments, to delay for at least a predetermined period the answering of a hall call for the opposite direction of travel registered at the landing adjacent the other of said two passenger compartments.

2. An elevator system according to claim 1, wherein said hall call answering equipment includes call cancellation circuitry for cancelling a hall call in response to the answering of said call, and said call answering delay equipment operates to delay the cancellation circuitry from operating to cancel said hall call for said other direction of travel for at least said predetermined period.

3. An elevator system according to either of the preceding claims, in which each passenger compartment of said car has a car door permitting passengers to transfer to and from the associated compartment, and wherein said control apparatus includes door control equipment and car starting equipment, said car starting equipment operating to start said car from rest to travel up in response to the registration of a hall call at a landing above the location of said upper compartment and to travel down in response to the registration of a hall call at a landing below the location of said lower compartment, and said hall call answering equipment operating when said car is at rest to cause said car to answer a hall call for either direction of travel registered at either landing adjacent one of said compartments while remaining at rest by causing the door control equipment to open the door of the compartment located adjacent said landing.

4. An elevator system according to any of the preceding claims, wherein said control apparatus includes direction establishing circuits which establish a preferred direction of travel for said car in response to the registration of a hall call, said direction establishing circuits enabling said hall call answering equipment to answer a registered hall call only after the direction of travel corresponding to the direction of said hall call is established.

5. An elevator system according to any of the preceding claims including car call registration devices in each of said compartments for operation by passengers in registering calls for travel to said landings and car call registration prevention circuitry operable in response to said car being located with its compartments located adjacent particular landings for preventing the operation of some of said car call registration devices in each of said compartments.

6. An elevator system according to claim 5 adapted for a building wherein said certain landings include an upper and a lower lobby landing adjacent each other and wherein said car call registration prevention circuitry is operable in response to said car being located with its upper and lower compartments adjacent said upper and lower lobby landings, respectively, and until said car travels in the up direction and answers a hall call with one of its compartments at a landing above the upper lobby landing.

7. An elevator system according to either claim 5 or claim 6, wherein each of said compartments includes car call registration devices for registering calls for predetermined ones of said landings which are identified as either odd or even landings and said car call registration prevention circuitry is operable to prevent the registration of car calls for the odd landings in one of said compartments and for the even landings in the other compartment.

8. An elevator system according to claim 7 wherein said car call registration prevention circuitry includes separate circuitry for each compartment, one said separate circuit being operable to prevent the operation of the car call registration devices for the odd landings in its associated compartment until the car stops with the compartment associated with said one separate circuit located adjacent one of said odd or even landings above the upper lobby and answers a hall call registered at said landing above, the other said separate circuit being operable to prevent the operation of the car call registration devices for the even landings in its associated compartment until the car stops with the compartment associated with said other separate circuit adjacent one of said odd or even landings above the upper lobby and answers a hall call registered at said landing above, both said separate circuits being rendered inoperable when said car is prepared for travel in the down direction notwithstanding either or both compartments did not answer a hall call or hall calls above said upper lobby.

9. An elevator system according to any of the preceding claims wherein a plurality of elevator cars, each having both an upper and a lower passenger compartment, are provided and wherein said control apparatus causes each said car to stop operating and enables it to remain at rest with each of its compartments located adjacent a different intermediate landing provided no call is registered to which the associated car can respond,

said hall call answering equipment operates to cause each said car to answer a registered hall call, and sail call answering delay equipment includes separate such equipment for each said car.

10. An elevator system according to claim 9 wherein hall call registration devices are located at said landings for registering up and down hall calls, said registration devices including a first hall call registration device located at a specific one of said landings for registering hall calls signifying desired travel in a predetermined direction from said landing to a first group of landings and a second hall call registration device located at said one specific landing for registering hall calls signifying desired travel in said predetermined direction from said landing to a second different group of landings, and stopping apparatus operating to stop only a first group of said cars with only their lower compartments adjacent the specific landing for hall calls registered by said first hall call registration device and to stop only a second and different group of cars with only their upper compartments adjacent the specific landing for hall calls registered by said second hall call registration device.

11. An elevator system according to claim 10 wherein stop prevention equipment is provided operable both to prevent said stopping apparatus from stopping said first group of cars with their upper compartments adjacent the specific landing in response to hall calls registered by said first hall call registration device and to prevent said stopping apparatus from stopping said second group of cars with their lower compartments adjacent the specific landing in response to hall calls registered by said second hall call registration device.

12. An elevator system according to either claim 10 or claim 11, including car call registration devices for each of said cars located in each of said compartments for registering car calls for travel to said landings, said stopping apparatus operating to stop each of said cars with a given one of its compartments adjacent a landing in response to the registration of a car call in said given compartment for said landing, and wherein car call registration prevention circuitry is provided operable to prevent the registration of car calls for said second group of landings in the lower compartments in said second group of cars when said cars are stopped with their lower compartments located adjacent said one specific landing.

13. An elevator system according to claim 11, including car call registration devices for of said cars located in each of said compartments for registering car calls for travel to said landings, and car call registration prevention circuitry, said stopping apparatus operating with respect to each of said cars to stop it with a given one of its compartments adjacent a landing in response to the registration of a car call in said given compartment for said landing, and further including car call registration prevention circuitry operable both to prevent the registration of car calls for said second group of landings in the lower compartments in said first group of cars when said cars are stopped with said lower compartments located adjacent said one specific landing and to prevent the registration of car calls for said first group of landings in the upper compartments in said second group of cars when said cars are stopped with said upper compartments located adjacent said one specific landing.

14. An elevator system according to claim 13, wherein said first hall call registration device located at said one specific landing registers hall calls signifying desired travel in a predetermined direction from said one specific landing to landings identified as odd landings and said second call registration device located at said one specific landing registers hall calls signifying desired travel in said predetermined direction from said one specific landing to landings identified as even landings, said stopping apparatus includes individual stopping apparatus for each of said cars, said stopping apparatus associated with said second group of cars operating to stop their respective cars with their upper compartments adjacent said one specific landing in response to even landing hall calls and said stopping apparatus associated with the first group of cars operating to stop their respective cars with the lower compartments adjacent said one specific landing in response to odd landing hall calls.

15. An elevator system according to claim 14, wherein said car call registration devices located in both the upper and lower compartments of each of said cars include devices for registering car calls for travel to both even and odd landings, and said car call registration prevention circuitry operates both to prevent the registration of car calls for odd landings in the upper compartments of said second group of cars when said cars are stopped with their upper compartments adjacent said one specific landing and to prevent the registration of car calls for even landings in the lower compartments of said first group of cars when said cars are stopped with their lower compartments adjacent said one specific landing.

16. An elevator system according to either claim 14 or claim 15, wherein said car call registration prevention circuitry is inoperable both to prevent the registration of car calls for odd landings in the upper compartments of said second group of cars after said cars stop with their upper compartments located adjacent a landing displaced from said one specific landing in said predetermined direc-

tion and to prevent the registration of car calls for even landings in the lower compartments of said first group of cars after said cars stop with the lower compartments adjacent a landing displaced from said one specific landing in said predetermined direction.

17. An elevator system according to claim 16, wherein said car call registration prevention circuitry includes circuitry individual to each compartment of each car, said upper compartment circuitry of each car being operable to prevent the registration of car calls for the landings identified as odd landings in the upper compartment of its associated car until said car stops while on a trip in said predetermined direction with its upper compartment adjacent a given landing removed from said one specific landing in said predetermined direction in response to a hall call registered at said given landing and said lower compartment circuitry of each car being operable to prevent the registration of car calls for the landings identified as even landings in the lower compartment of its associated car until said car stops while on a trip in said predetermined direction with its lower compartment adjacent a given landing removed from said one specific langing in said predetermined direction in response to a hall call registered at said given landing.

18. An elevator system according to claim 17, including selection circuitry operable in response to one of said second group of cars and one of said first group of cars both being situated with one of their compartments located adjacent one of said terminal landings for selecting one of said cars as the next to leave said terminal landing and selection transfer circuitry operable to transfer selection from said selected car to the other car located at said terminal landing upon the registration of a hall call at said one specific landing for which said selected car cannot stop with either of its compartments.

19. An elevator system according to claim 18, in which said certain adjacent landings include an upper and a lower lobby landing adjacent each other, and wherein said selection circuitry operates in response to one of said second group of cars and one of said first group of cars both being situated with their compartments located adjacent said upper and lower lobby landings to select one of the cars as the next to leave said lobbies, said lower compartment car call registration prevention circuitry of each of said second group of cars operates to prevent the registration of a car call for said one specific landing in its respective compartment while it is located at said lower lobby and said upper compartment car call registration prevention circuitry of each of said first group of cars operates to prevent the registration of a car call for said one specific landing in its respective compartment while it is located adjacent the upper lobby, and wherein said selection transfer circuitry operates to transfer selection from the selected car to the other located at said lobbies in response to the registration of a hall call at that one of said lobbies at which the compartment of the selected car is located in which a car call for said one specific landing is prevented from being registered and in response to the absence of the registration of a car call in either compartment of the selected car for a predetermined period after the registration of said lobby hall call.

20. An elevator system according to claim 19 wherein said selection transfer circuitry operates to prevent the answering of a hall call registered at either lobby in the absence of a registered car call in either compartment of said selected car when the compartment of the selected car located adjacent the lobby at which said hall call is registered is prevented from stopping at said one specific landing.

21. An elevator system according to claim 14, in which said certain landings include an upper and a lower lobby landing, and wherein said car call registration prevention circuitry operates to prevent the registration of a car call for said one specific landing both in the lower compartments of said second group of cars while said compartments are adjacent said lower lobby and in the upper compartments of said first group of cars while said compartments are adjacent said upper lobby and said control apparatus includes insufficient lobby car circuitry which operates to cause one of said second group of cars to travel to the lobbies if none of said second group of cars is located thereat and to cause one of said first group of cars to travel to the lobbies if none of said first group of cars is located thereat.

22. An elevator system according to claim 21, wherein said control apparatus includes excessive lobby car circuitry which operates in response to the location at said lobbies of a number of said cars in excess of one of said second group of cars and one of said first group of cars to cause the excess of said cars to leave said lobbies until only one of

said second group of cars and one of said first group of cars is located thereat.

23. An elevator system substantially as hereinbefore described with reference to the accompanying drawings.

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