Feb. 22, 1966 R. A. BURGY ETAL 3,236,332

ELEVATOR CONTROL INCLUDING MEANS TO SELECT MOST FAVORABLE CAR TO EXCLUSIVELY SERVE A PRIORITY CALL

Original Filed Nov. 2, 1959 5 Sheets-Sheet 1

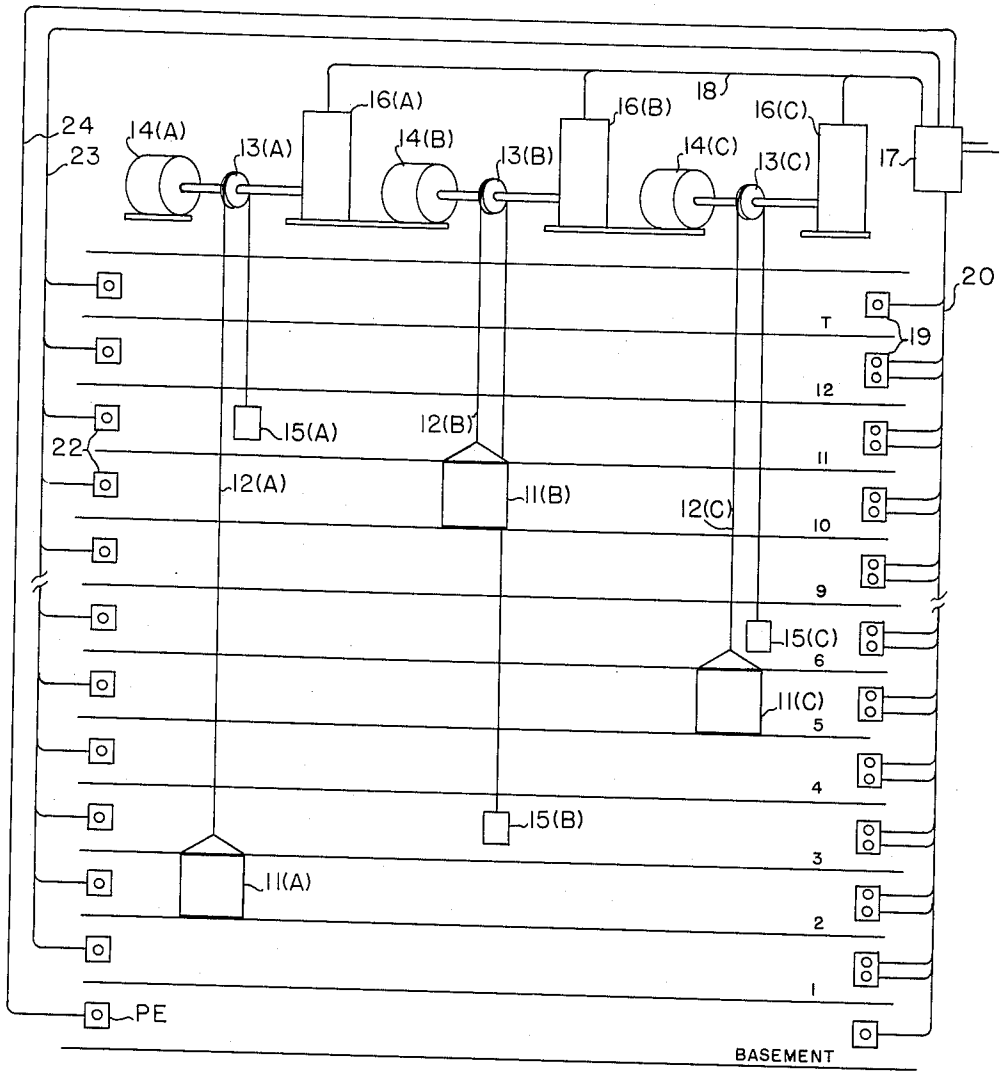

Fig. 1

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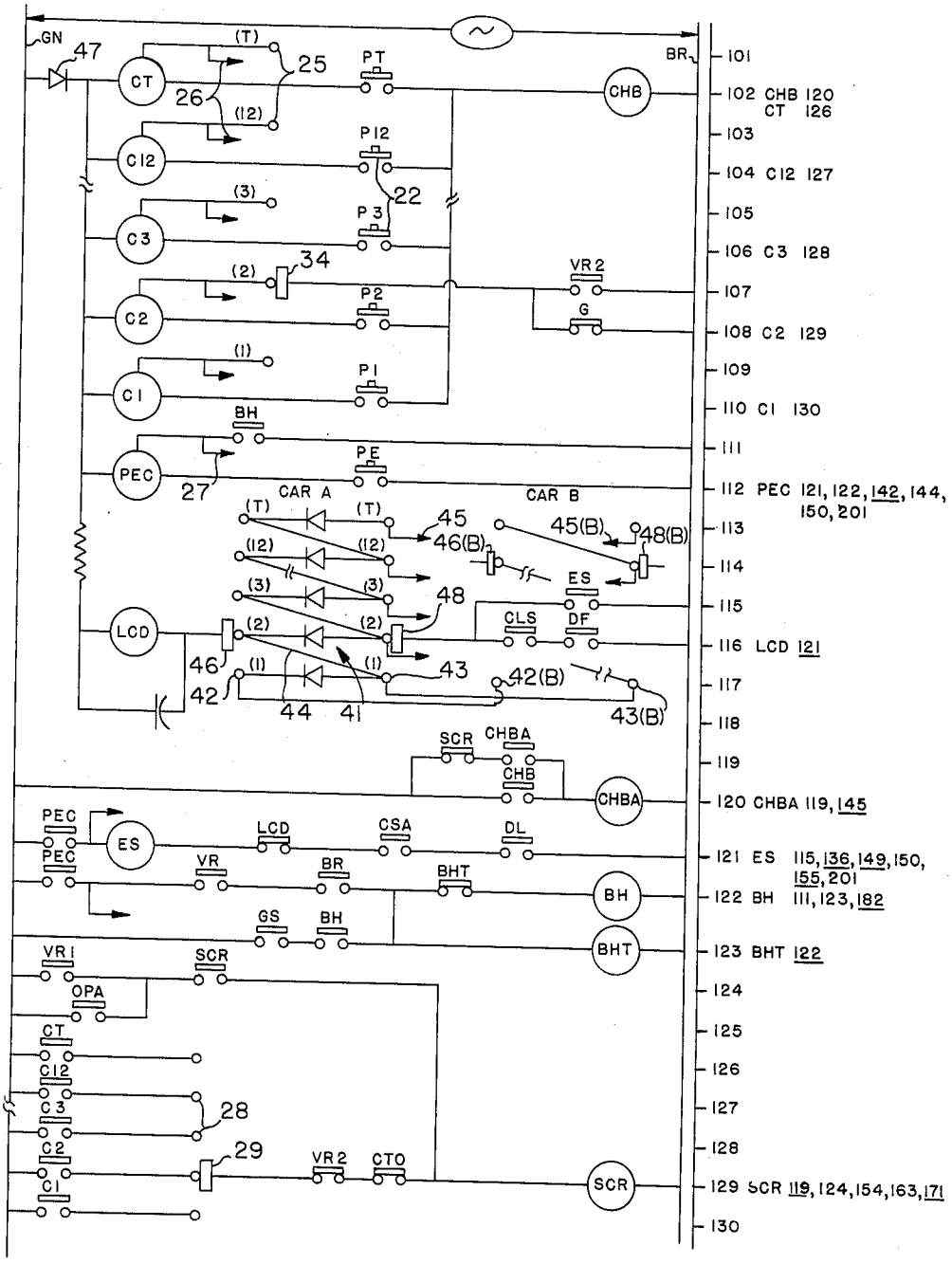

Fig. II

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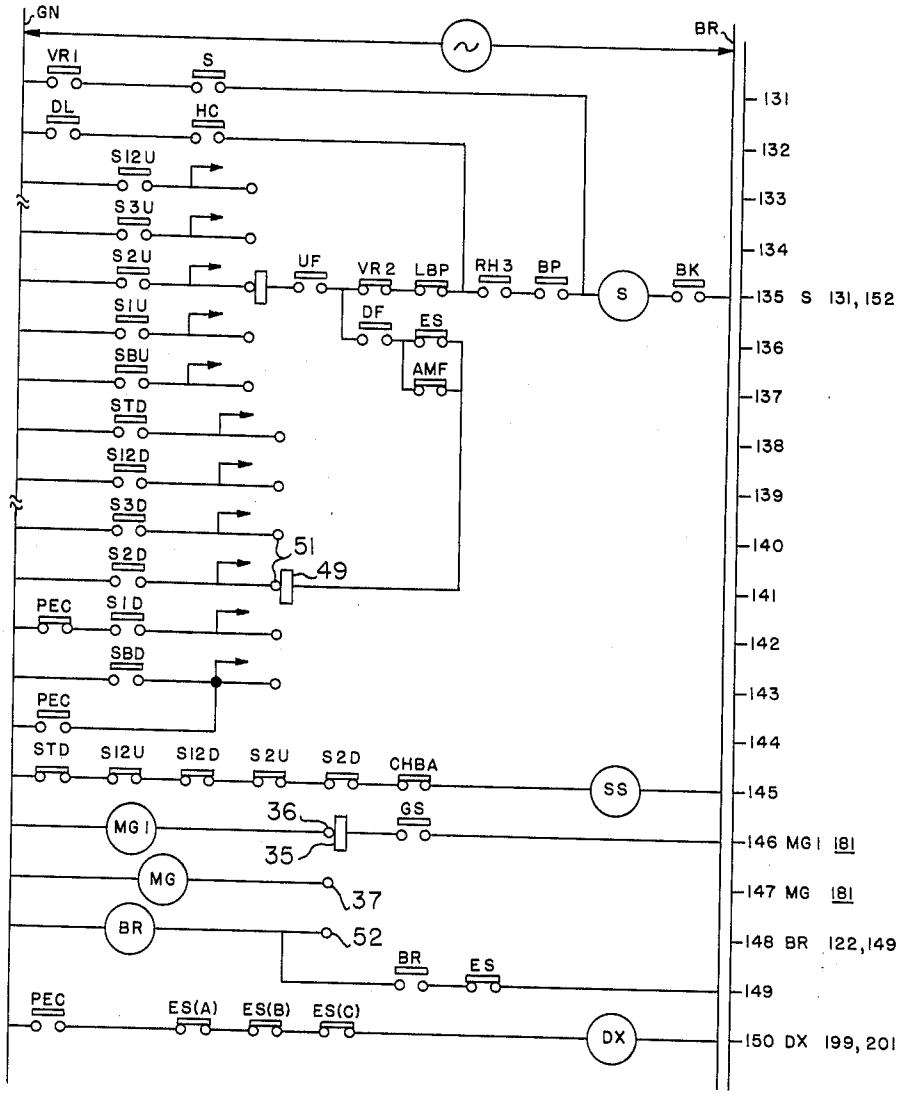

Fig III

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Original Filed Nov. 2, 1959 5 Sheets-Sheet 4

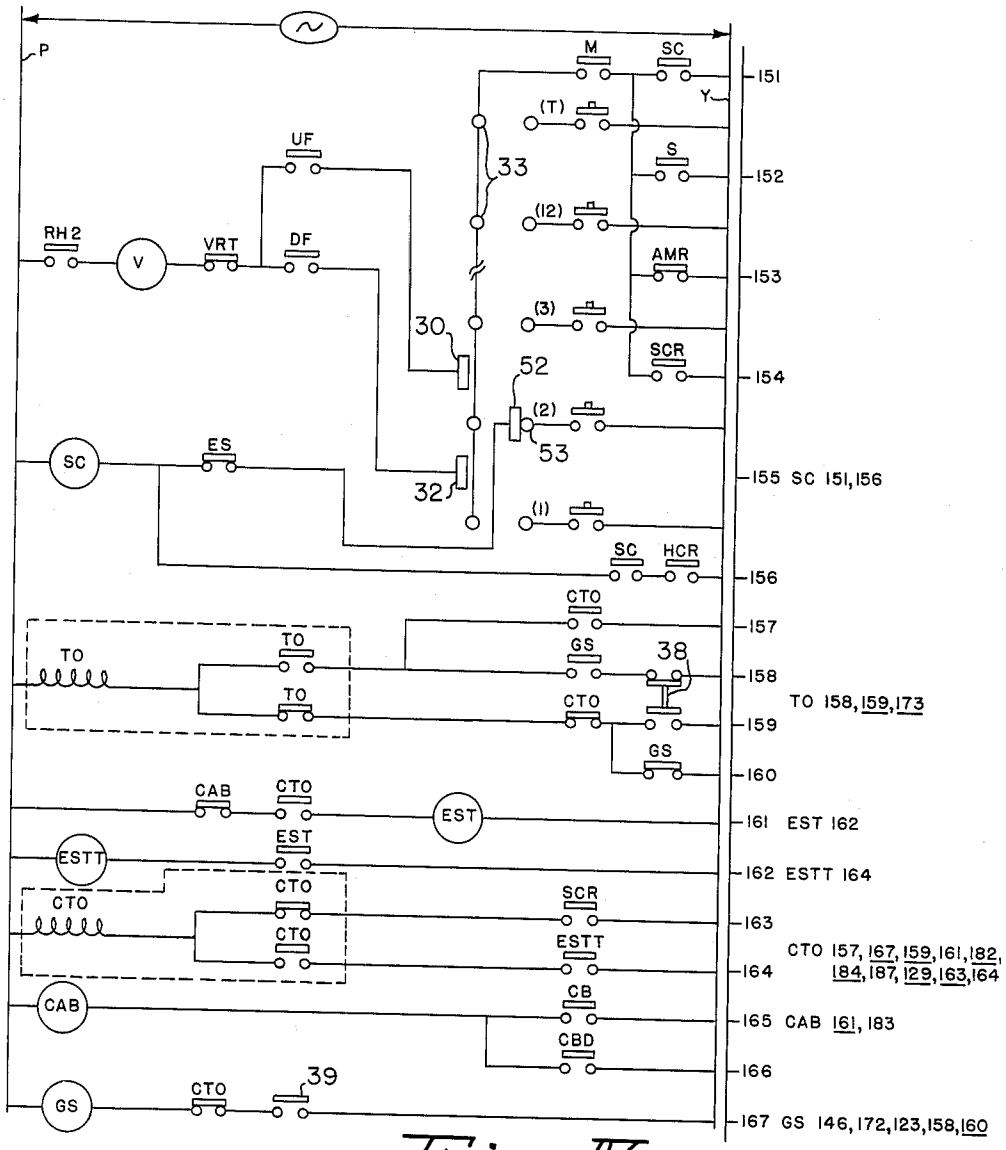

Fig. IV

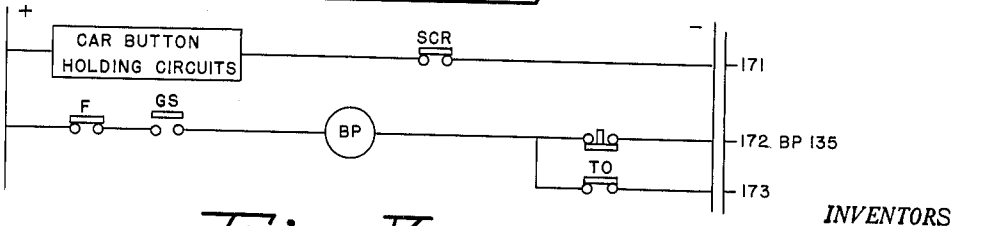

Fig. V

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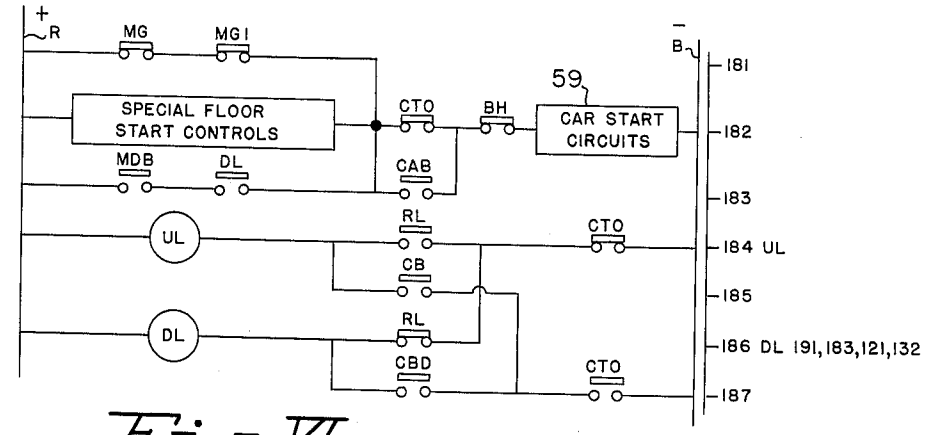

Fig VI

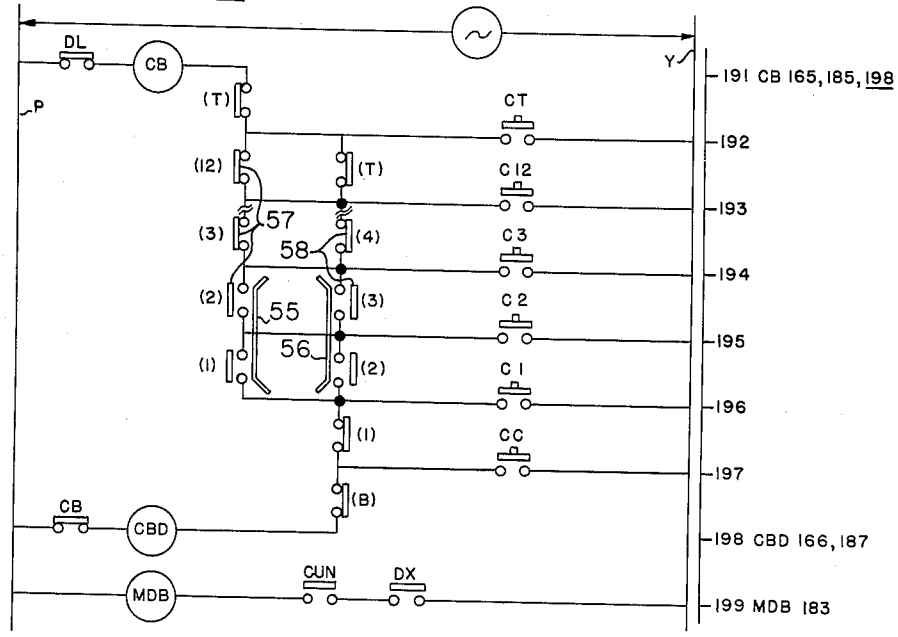

Fig VII

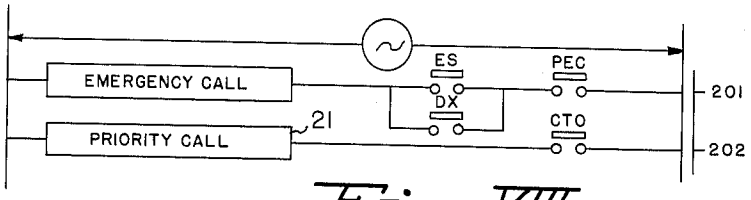

Fig VIII

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United States Patent Office

3,236,332
Patented Feb. 22, 1966

3,236,332

ELEVATOR CONTROL INCLUDING MEANS TO SELECT MOST FAVORABLE CAR TO EXCLUSIVELY SERVE A PRIORITY CALL

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Continuation of application Ser. No. 850,243, Nov. 2, 1959. This application Sept. 19, 1961, Ser. No. 141,235
10 Claims. (Cl. 187—29)

This invention relates to elevator controls and more particularly to controls which enable elevator cars to be appropriated from normal service for priority service, which is a continuation of application Serial No. 850,243 which was filed on November 2, 1959, which is now abandoned.

Heretofore, the appropriation of an elevator from a group or from normal service to provide priority service has been known. In particular, elevator banks for hospitals have been arranged such that they can be operated to exclude all controls with the exception of those operated from within the car. Thus, key switches have been provided so that the cars can be operated by constant pressure push button control rather than in their normal mode. In United States Patent No. 2,862,576, which issued December 2, 1958, to W. A. Nikazy and P. F. De Lamater for "Elevator Control," one car of a bank of elevators was illustrated as having means actuated from a concealed riser of hall buttons for isolating it from regular service after it had served its current load and assigning it to special service so long as special service calls are registered within a given interval of each other. In United States Patent 2,860,728 for "Elevator Controls," which issued November 18, 1958 to R. A. Burgy, means were disclosed for expediting the dispatch of a car adapted to serve a floor which is served by less than all of the cars in the bank in response to a call registered at that floor. None of these systems provided means for immediately instituting an expedited travel of an elevator car to a high priority call. Further, none of them involved the appropriation of any one of a plurality of elevators from a bank of elevators.

The present invention is concerned with providing service of the highest priority in response to special calls by selecting the first available car in the bank of elevators to perform that service and by rejecting all other demands either common to the cars of the bank or individual to the selected car. This form of service is particularly desirable in hospitals as where patients are transmitted between treatment areas by elevator service. Priority service is afforded by means of a separate riser of hall buttons ordinarily maintained inaccessible or at least concealed from the normal elevator passenger so that the car can be appropriated for high priority service in any of a plurality of floors in the building. Further, the system is arranged to provide maximum priority service to one floor which for purposes of illustration has been chosen as the floor below the normal lower dispatching floor. Thus in a hospital where this lower floor is the emergency entrance offering direct access to ambulances, a car is appropriated in response to priority calls registered at this maximum priority landing. The selected car is that car which is situated so that it can be brought to that landing in the shortest time. It is immediately selected to serve that landing and rejects all other calls which it might otherwise serve, including calls currently registered in the car, to proceed directly to that landing and maintain itself available for service therefrom. A service of this nature is also well suited where police protection is required as, for example, in the case of a bank in which the police are situated at a given floor and call means such as annunciators are provided to indicate calls at the other floors for the police. Rapid transportation to those floors is afforded by utilizing a car expediting and appropriating circuit of the maximum priority type.

In view of the above, an object of this invention is to improve elevator service.

Another object is to enable utilization of elevator cars to insure maximum efficiency in an elevator system.

A further object is to expedite elevator service for priority calls.

Another object is to prevent the interruption of service to priority calls by any normally imposed call.

A further object is to select that car of a bank of cars which is best situated to serve a priority call.

Another object is to provide priority service by one or a limited number of cars without disrupting the normal service provided by the remaining cars in the elevator bank.

One feature of this invention involves means for selecting from a group of cars functioning in normal operation as an elevator group or bank one car for priority service in response to a priority call registered by a means other than the normal call registering means utilized in conventional elevator group operation. A subsidiary aspect of this feature resides in appropriating the first car to approach the landing for which the priority call is registered without regard to the direction of travel of that car. A second subsidiary feature comprises selecting the car in the normal group service which is best situated as by proximity and/or direction of travel to serve the priority call and causing that car to proceed to that call. In the case of a group of elevators subject to dispatching in which the cars are stopped, as due to an absence of calls imposed on the system, a priority call is arranged to institute the release of a car from the dispatching floor for travel to the priority call.

Another feature resides in means which cancel all of the car calls registered within the appropriate car, and thereafter renders the car responsive only to subsequently registered car calls.

Another feature comprises means for returning the car appropriated for priority service to normal group service automatically. Advantageously, this return can be instituted by the absence of a priority service utilization for a given interval.

Additional features include means for rendering the selected car of the group nonresponsive to hall calls while the unselected cars continue to serve those calls;

means to prevent restarting of a car by unauthorized personnel after it has been stopped for priority service; and means available to authorized personnel to enable restarting and travel of a selected car only in response to calls imposed by such personnel.

The above and additional objects and features of this invention will be more fully appreciated from the following detailed description when read with reference to the accompanying drawings in which:

FIG. I is a schematic representation of three elevator cars operating as a group and having in addition to the conventional hall call registering means, a priority call registering means for each floor;

FIG. II is an across-the-line circuit diagram of the priority call registering means showing certain aspects of those means common to all cars in the group and other aspects individual to car A of the group as typical, together with the maximum priority call car selection circuits;

FIG. III is an across-the-line circuit diagram of the conventional hall call stopping circuit, hall call sensing circuit, and certain of the car position indicating circuits of a typical car as modified in accordance with this invention;

FIG. IV is an across-the-line circuit diagram of portions of the car stopping circuit, car call pick up circuit, throwover switches for establishing priority call service, and means to return a car from priority call service to normal service, all individual to a typical car functioning in a system to which this invention is applicable;

FIG. V is an across-the-line diagram partially in block form showing the car button holding and by-passing circuits as employed according to this invention;

FIG. VI is an across-the-line circuit diagram partially in block form of the car starting circuits and the direction control circuits individual to a car to which this invention is applicable;

FIG. VII is an across-the-line diagram of a circuit sensing the location of car calls with respect to the current position of the car and for instituting, in response to a priority call, the start of a car detained by a dispatcher mechanism; and,

FIG. VIII are typical indicator circuits shown in across-the-line form.

The present invention is illustrated as applied to a group of three elevators serving fourteen landings including a basement, a lower main landing, a top main landing and eleven intermediate landings. Advantageously, cars can be arranged to be released for travel from the dispatching floors by a dispatch timer (not shown) at intervals which depend upon the demands imposed and the utilization of the system. Normally, the cars will travel between the lower and upper main landings stopping at those landings or at their farthest calls and reversing for travel to the opposite main landing. Much of the signal and control mechanisms individual to the cars and common to the group of cars is not shown in the present disclosure. It is to be understood that this invention is applicable to many forms of modern elevator systems whether they involve dispatching or not. However, for purposes of illustration, the invention may be considered as suitable for integration in a system of the type disclosed in R. A. Burgy United States patent application Serial No. 808,290 which was filed March 30, 1959 and is entitled "Elevator Controls." As illustrated the cars are arranged to be operated either with or without attendants and can be shifted individually between those modes of operation by a suitable throwover switch TO although the features of the present invention are particularly well suited to be performed automatically.

The automatic elevator system with which the present invention is illustrated is set forth schematically in FIG. I. Three cars, cars A, B and C, are shown. However, throughout this specification and the drawings, the circuits individual to the cars have been shown only for one of the three cars, it being understood that the other cars of the group have similar circuits which, where integrated with common circuit elements, are interconnected by means of arrowheaded leads which will be noted below. In the illustrated system of FIG. I the basement floor has been labeled as such. The lower main terminal has been designated as landing **1** and the upper terminal as landing T. Intermediate floors **2** through **12** exist, although only typical floors are shown and in the circuits only the two upper and the four lower floors have been shown. It will be understood, of course, that the invention is applicable to a bank of elevators containing any number of cars and serving any number of floors. In FIG. I where duplicate elements are shown for the several cars, those elements individual to the cars have been identified therewith by the suffix letter of the car enclosed in parenthesis. The elements individually associated with car A include car **11** suspended from cables **12** trained over a traction sheave **13** driven by a lifting motor **14** which may be of any convenient type but conveniently is arranged for variable voltage control as in the well-known Ward Leonard system. Coupled to the opposite end of the lifting cable **12** is a counter weight **15**. A floor selector **16** is associated with a car to establish appropriate circuits for the car position at any instant. This floor selector can be of the commutating type carrying a plurality of brushes on a cross head arranged for vertical travel along parallel lanes of contacts to correspond to critical car locations along the path of car travel. Ordinarily, contacts having similar functions at the several landings are oriented in vertical lanes and the contacts performing different functions at each landing are generally aligned in rows transverse of those lanes. The cross head also may include cams which operate contacts along its path of travel. Such contacts are used particularly in isolating circuits in order to sense the relationship of car position in those circuits as, for example, the position of a car with respect to the location of a floor for which a call is registered as shown in FIG. VII. The crosshead can be arranged either to move in synchronism with the car or in advance of the running car and in the same position as the car when it is stopped. While the contacts of the floors selector illustrated in the circuits to be described are mechanically commutated for a crosshead which is advanced with respect to the car while it is running, it is to be appreciated that the controls employing electromechanical or relay type floor selectors and other forms of floor selector devices also lend themselves to systems in which this invention is utilized.

Each of cars A through C have individual controls including the floor selector **16**(A) through **16**(C) and supplemental equipment operated from these floor selectors. All of these car controls are integrated into a system insuring an interrelated operation of the cars by means of a group supervisory control schematically represented by the rectangle **17** linked to the floor selector and individual car control circuits by cable **18**. The group supervisory control **17** can include means for establishing various operating programs in accordance with manual selecting devices, clock control selecting devices or means sensing conditions in the elevator system such as car stop time, car loading, the number of calls, the length of registration of unanswered calls and the relative position of the cars. It can also include dispatching devices of the timing type or those which respond to the car position or the calls imposed on the system.

In considering the invention, operation of the cars with no attendants will be described, whereby passengers on the cars select the floors at which the cars are to stop and prospective passengers cause the cars to stop by registering calls at the landing. Landing call registering means **19** are located at each of the several floors and include down hall call means at the top through the first floor and up hall call registering means at the basement through the floor adjacent the top or the 12th floor in the example. These call registering means are common to all the cars and are represented as interconnected to the several cars through the group supervisory control rectangle **17** by means of cabling **20**. In normal operation it is advantageous to have the landing call registering means effective only with respect to cars traveling in the call direction, thus ascending cars respond only to up hall calls and descending cars respond only to down hall calls. The control panels within the cars including the car call registering buttons are not shown in FIG. I. Calls registered on those buttons are individual to the several cars.

A riser of priority call buttons **22** common to all the cars is shown on the left side of the group in FIG. I to represent call means which are remote from the normal hall call buttons. One priority call button is provided at each landing in the illustrative embodiment inasmuch as those buttons are effective to stop a car traveling in either direction at the landing for which the priority call has been registered. The priority call buttons **22** are connected to the group supervisory control rectangle **17** by means of cabling **23** to signify that all cars are responsive to priority calls. Buttons **22** are located at the first or main landing through the top landing and function to stop the first car to approach the landing and appropriate that car to priority service while rejecting the then registered car calls. High priority service is provided to the basement by means of high priority call button PE. This button institutes functions somewhat different from those instituted by buttons **22** in that it selects the lowest down traveling car of the group by virtue of its signal imposed on its group supervisory control **17** through cable **24** to expedite the travel of that car to the high priority call by causing that car to disregard all car and hall calls and proceed directly to the basement.

In order to facilitate an understanding of the circuits illustrated in FIGS. II through VI, an alphabetical listing of the symbols for the relays and contacts utilized is presented below, together with a short description of those relays, and if shown, the location of their actuating coils. All of the circuits are in across-the-line diagram form. Relay contacts are often located remote from their actuating coils. In order to correlate the location of the actuating coils and contacts, a marginal key has been employed with each circuit diagram. With this key, each diagram has been divided into horizontal bands which are identified with line numbers in the right hand margin. Relay symbols are located in the margin to the right of the line numerals and in horizontal alignment with the coil positions. The location of each contact actuated by a relay coil is set forth to the right of the relay symbol in the key by the numeral of the line upon which it appears. The numerals designating the location of back contacts, those which are normally closed when the relay is deenergized and are open when it is energized, are underlined in the key to distinguish them from front contacts, those which are closed upon the energization of their actuating coil. Thus, priority call stopping relay SCR has its coil located at line **129**, front contacts at lines **124**, **154** and **163** and back contacts located at **119** and **171**, all as signified by the numerals in the right hand portion of the margin in FIG. 75

II. The relay and switch symbols as illustrated are as follows:

Symbol	Description	Line Location
AMR	Advance Motor Relay	
BH	Priority Floor Holding Relay	122
BHT	Priority Floor Holding Timer	123
BK	Brake Relay	
BP	By-Pass Relay	172
BR	Basement Relay	148
CAB	Car Call Indication Relay	165
CHB	Priority Riser Hold Button Relay	102
CHBA	Auxiliary Priority Riser Hold Button Relay.	120
CLS	Door Close Relay	
CSA	Car Start Relay	
CTO	Priority Service Throwover Switch	163
CUN	Lower Terminal Car Selection Relay	
C1-C12 and CT	Priority Landing Call Relays	102–110
DE	Down Generator Field Relay	
DL	Down Signal Direction Relay	186
DX	Basement Floor Assignment Relay	150
ES	Emergency Service Relay	121
EST	Group Service Return Timer	161
ESTT	Auxiliary Group Service Return Timer.	162
GS	Group Service Relay	167
LBP	Load By-Pass Relay	
LCD	Lowest Down Car Relay	116
M	Main Switch	
MDB	Basement Floor Control Relay	199
MG	Main Floor Dispatching Relay	147
MGI	Top Floor Dispatching Relay	146
OPA	Door Open Relay	
RH2	Second Rheostat Relay	
RH3	Third Rheostat Relay	
RL	Direction Throwover Switch	
S	Landing Signal Stopping Relay	135
SC	Vernier Stopping Sequence Relay	155
SCR	Priority Call Stopping Relay	129
SS	Landing Call Indication Relay	145
S1D-STD	Down Landing Call Relays, First to Top Floor.	
S12U-SBU	Up Landing Call Relays, Basement to 12th Floor.	
TO	Attendant Throwover Switch	158
UF	Up Generator Field Relay	
UL	Up Signal Direction Relay	186
V	Advance Motor Stopping Relay	153
VR	Advance Motor Stopping Relay	
VRT	Advance Motor Stopping Relay	
VR1	First Advance Motor Stopping Relay	
VR2	Second Advance Motor Stopping Relay.	

FIG. II shows a portion of the family of priority hall call relays C1, C2, C3, C12 and CT which are common to the cars for the typical floors 1, 2, 3, 12 and top. Each of these relays is of the magnetic latch type and is pulled in by a momentary closing of the priority call buttons P1, P2, P3, P12 and PT, respectively, so that it is magnetically latched in its closed position with their contacts at lines **126** through **130** closed. This type of relay is reset by energizing a separate reset coil magnetically. The residual flux within the relay core is reduced below the level required to hold the armature in when current is drawn from the lead connected to the main lead G*n* and lead connected to the family of floor selector segments **25** individual to the several floors as indicated by the parenthetical floor designations adjacent thereto. It is to be noted that the reset circuits are paralleled for the several cars capable of providing priority service and for this purpose the reset contacts on the individual floor selectors for the cars are interconnected by the arrowheaded leads **26**. High priority call relay PEC at line **112** is energized by the closing of button PE and is reset when a car arrives at the high priority landing, in the basement in this example, through the closure of priority floor holding relay BH upon the arrival of the car at the basement. The reset circuit for this relay is also paralleled for the several cars through their individual BH contacts by means of arrowheaded lead **27**. Momentarily, closure of any of the priority call buttons energizes priority riser hall button relay CHB at line **102** to momentarily close its contact at line **120**, thereby pulling in auxiliary priority riser hall button relay CHBA which seals itself in at line **119**.

Initial consideration will be given to priority call response. Thereafter high priority call response will be outlined.

The energization of any one of relays C1 through CT and CHB by the registration of a priority call pulls in relay CHBA and activates priority call stopping segments 28 in the priority call stopping floor selector lane. When a car approaches the landing for which the priority call is registered so that its crosshead carries brush 29 into contact with an activated segment 28, priority call stopping relay SCR at line 129 is energized through back contact VR2 and back contact CTO. This initiates a stopping sequence for the car by closing contact SCR at line 154 to energize advance motor stopping relay V at line 153 through closed rheostat relay contact RH2, vernier relay back contact VRT, generator field direction contact UF for an ascending car or DF for a descending car, brush 30 for an ascending car or 32 for a descending car, a stopping segment 33 on the floor selector, closed main switch M at line 151 and closed contact SCR. This initiates the stopping of the car in the manner described in detail in the aforenoted Burgy application, operating relays VR1 and VR2 in sequence and as the car comes to a halt dropping out relays RH3 and then RH2. It is to be noted that the energizing circuit for relay SCR is not sensitive to the direction of travel of the cars but rather responds for either direction of travel on the contact of the brush 29 with an active segment 28. SCR seals itself in by closing its contact at 124 when the stopping relay VR pulls in the first vernier relay VR1 to close its contact at 124. Shortly thereafter second vernier relay VR2 is operated to close its contact at line 107 resetting the priority call which caused the car to stop through the now active brush 34 in engagement with the reset segment 25 for that floor. This prevents additional cars, which in traveling past the floor for which the priority call was registered cause their brushes 29 to engage corresponding active segments 28 on their floor selectors, from actuating their priority call stopping relays SCR. In this manner only one car responds to a given priority call. At the time that the priority call is reset by VR2, the initiating circuit for relay SCR is opened by the opening of back contacts VR2 at line 129 with no effect. SCR also deenergizes the auxiliary priority riser hall button relay CHBA by opening back contact SCR at line 119. At this time the operation of CHBA is no longer necessary since its principal function is to institute the travel of a car from the dispatching floor in the event that the dispatcher has been detented as by the absence of a normal hall call. This detent release is effected when a priority call is registered through the opening of back contacts CHBA at line 145 to drop the hall call indicating relay SS. The function of this relay in releasing the dispatcher detent is set forth in detail in the aforenoted Burgy application.

Since it is desired to appropriate the car which has stopped for a priority call exclusively for priority service, those calls registered by passengers in the car at the time of selection are cancelled as the car arrives at the priority call by the opening of back contacts SCR at line 171 to break the car button holding circuits. In the example, operated car buttons are normally held by energized holding coils until the car is reversed.

At the time of selection the car is also removed from its normal service by priority throwover switch CTO at line 163 operated through closed contact SCR at 163 and closed limit contact of the CTO switch at 163. This switch is of the motor driven type and is arranged so that upon reaching its limit of travel in the direction setting up priority service, the CTO limit switch at 163 is opened and that at 164 is closed while at the opposite limit of travel the limit switch at 163 is closed while that at 164 is opened to condition the car for normal service. Thus, in response to the operation of relay SCR, the limit switches CTO are driven to the position shown in the drawings and upon the opening of contact CTO at 163, the throwover switch ceases operation with its several contacts in the priority service condition. Thus, the attendant throwover switch is operated to insure that the prority service car is set for automatic operation by the closure of contact CTO at 157 and the opening of back contact CTO at 159. Attendant throwover switch TO is the same type as switch CTO. When the TO limits at 158 and 159 are in the position shown all of the car circuits are set for automatic operation. CTO in opening its contact at 167 takes the appropriated car out of group service by dropping relay GS. By closing its contact at line 161 relay CTO conditions the group service return timer EST for operation upon the termination of priority service. CTO opens its back contact at 182 to disable the normal car starting circuits in order to prevent any passengers which may currently be aboard the car at the time it is appropriated for priority service from taking the car from the priority call. CTO can also be arranged to actuate a suitable indicating device such as an illuminated sign 21 as at 202 bearing the legend "Priority Call" to indicate the car is assigned priority service, or an audible signal can be issued to that effect.

Removal of the selected priority service car from group service renders that car nonresponsive to landing calls. CTO deenergizes GS at 167 to deenergize by-pass relay BP at 172 by opening contact GS at 172. By-pass relay BP opens its contact BP at 135 in the landing signal stopping circuit to prevent operation of landing signal stopping relay S. After the car is stopped and the door is fully opened, relay SCR is reset to render the car button circuits available for priority calls in the selected car through contact SCR at 171.

As the car stops in response to the priority call, the VR1 and VR2 relays drop out. However, SCR is maintained energized to assure completion of the operation of CTO during the door opening interval by door opening relay contact OPA at 125. As the door of the car approaches its fully opened position, contact OPA is dropped out and relay SCR is deenergized.

It is to be noted that priority calls at other floors can be registered while the above described operations are occurring, and further, that upon the dropping of relay SCR, relay CHBA again becomes effective to release the dispatch detent of a car in response to any other priority call. However, a selected car can respond only to the priority call causing its selection since back contact CTO at 129 in the priority call stopping relay circuit is open. Car calls within the car function to hold priority service so long as such calls are maintained.

Priority service is provided by an appropriated car through the car button circuits only. These circuits may be of the type disclosed in FIG. VII and described in detail in the aforenoted Burgy application wherein they are arranged to actuate a car call above relay CB when a car call is registered above the effective position of a car and a car call below relay CBD when a car call is registered below the effective position of a car. Ordinarily, car direction is established by direction throwover relay RL, not shown, through the operation of its contacts at lines 184 and 186 to pull in the down signal direction relay DL or the up signal direction UL. When the priority throwover switch operates, it disables the circuits responsive to the operation of the direction throwover switch RL by opening back contact CTO at 184 and in its stead inserts a direction control through closed contacts CTO at line 187, that new control being by virtue of car button contacts CB and CBD of a car call above and car call below relays.

Upon operation of a car button for a landing displaced from a priority call subsequent to the appropriation of a car for priority service, that car is conditioned to travel to that floor by direction relays UL or DL and is started toward that floor by a modified conventional car starting circuit shown at lines 181 and 183.

A portion of a car call control circuit is shown in FIG. VII connected across direct current supply leads P and Y for an individual car controller. This circuit indicates the

direction in which calls are displaced from the current effective position of the car. When the crosshead of the floor selector for a car is at the second floor position, the car effectively is at the second floor, cams 55 and 56 carried by the crosshead open circuit isolating contacts 57 and 58 to separate the car call circuits into two groups. Those circuits for landings above the car remain connected to car call above relay CB at 191 while those for landings below are connected to car call below relay CBD at 198. Second landing car button is segregated by open contacts 57(1) and (2) and open contacts 58(2) and (3) so that car calls for landings above as by closure of car button contact C3 at 194 completes a circuit through closed contacts 58(4) through (T) and closed contacts 57(3) through (T) for coil CB so long as down direction relay contact DL at 191 is closed. Similarly, a car call for the first or basement landing registered by closing C1 at 196 or CC at 197 will complete a circuit for relay CBD at 198 provided no car call for a landing above the car has first energized relay CB to open back contact CB at 198. A car call above the car energizes up signal direction relay UL by closing contact CB at 185 to complete a circuit from the individual car control, direct current supplied leads R and B through UL at 184, contact CB at 185, and contact CTO at 187. A call below the car sets the down direction by energizing relay DL at 186 from lead R, through contacts CBD and CTO at 187 to lead B.

Once the direction of travel is set by a call, the car starts as soon as its standing interval has expired. Since the car has been taken out of group service, contact GS at line 146 is opened in the circuit to brush 35, whereby the positioning of the car is ineffective to prevent blockage of the usual car starting circuits. In normal operation a car at the top terminal has brush 35 in engagement with segment 36 to energize relay MG1 and at the bottom terminal has brush 35 in engagement with segment 37 to energize relay MG. Open front contact GS at 146 disables relays MG and MG1 so that contacts MG and MG1 at 181 close by-passing the special floor start circuits. When a car call is registered above or below the car to close contacts CB at 165 or CBD at 166, respectively, car call indication relay CAB is energized to close its contact at line 183 around the open priority throwover switch contact CTO at 182 in the car start circuits. Thus, upon the expiration of the normal standing time at the floor as determined in the car start circuits of block 59 and as shown in detail in the aforenoted Burgy application, the car start circuits are energized, car doors close automatically and the car proceeds in the established direction to respond to the calls registered therein.

An appropriated car continues to respond to calls as a priority service car so long as calls are registered in the car, either in overlapping relationship or within a given interval of each other. That interval is determined by the group service return timer EST at line 161. Whenever no car calls are registered, relay CAB is dropped out to close its back contact at line 161 which in cooperation with the closed CTO contact energizes EST. Relay EST is of the slow pickup type being timed for some interval, of the order of ten or fifteen seconds, sufficient to enable a priority utilization to be initiated after the car is brought to a stop at a floor for which a priority call is registered. If no call is registered for the interval required to time out relay EST, it closes its contact at line 162 to energize auxiliary group service return timer ESTT which closes its contact in line 164 to complete a resetting circuit for the priority throwover switch through closed priority throwover switch limit contact at 164, whereby the car is returned to normal service by returning all of the CTO contacts to the positions shown in the drawings. Switch CTO requires a substantial interval to run between its limits. During this interval its contacts are operated. In order to insure completion of the CTO reset even after contact CTO at 161 is opened, relay ESTT is of the slow drop out type having an interval in excess of the reset time for CTO. Thus CTO at 164 opens before contact ESTT at 164.

As a result of the reset of CTO, car operation is returned to that state established by the position of the manual attendant throwover switch 38 through the opening of contacts CTO at 157 and the closing of back contact for CTO at 159. The energizing circuit for timer EST is opened by contact CTO at 161, the car is returned to group service by the closure of back contact CTO at line 167 provided its group service selection switch 39 is closed. The car starting circuits are returned to normal operation by the closing of back contacts CTO at 182 and the signal direction relay circuits are returned to the control of direction throwover switch RL by opening contacts CTO at 187 and the closing of back contact CTO at 184.

Where priority service is to be expedited to an even greater extent than provided by the above described mode of operation, high priority call means can be provided. This is particularly appropriate in the case of the emergency patient entrance to a hospital or the security guard station in a building. In the example, high priority service means are provided for the basement floor to give the most rapid service possible to calls at that floor short of assigning an elevator continuously to serve that location. This service is afforded by appropriating any car from the group in response to a high priority call, causing that car to run directly to that floor to which the high priority call is registered, stopping the car at that floor and holding the car at that floor until authorized personnel initiate the operation necessary to provide their priority service.

A high priority call is registered by closing the contact controlled by button PE at line 112 to energize magnetic latch relay PEC. Since a car can travel a number of floors in the same time it takes for it to close its doors and start, the most rapid response to a high priority call is afforded by appropriating a car traveling toward the priority floor for service to that call and by causing the car to proceed directly thereto. Since the high priority station is below the main dispatching floor in the illustrative system, the lowest down traveling car is appropriated to serve high priority calls upon their registration. Lowest down traveling car relay LCD individual to each of the cars is dropped out for the lowest down traveling car while all other down traveling cars have their relays LCD energized through the inter-connected rectifier chain 41 shown at lines 113 through 117 for the exemplary floors T, 12, 3, 2 and 1. Two lanes of floor selector segments, 42 and 43, are provided with a segment for each floor in each lane. An inter-connection is provided from each floor segment in family 43 to the segment corresponding to the next floor above in the family 42 on each floor selector by means of the jumpers 44. Each of these inter-connected sets of floor selector segments are paralleled by means of the arrowheaded leads 45 connected to the individual floor selector segments of the floor selector segment family 43 for the several cars. A unidirectionally conductive path is provided between the floor selector segment families 43 and 42 by means of a rectifier family 41, individual rectifiers being connected between floor selector segments of families 43 and 42 for the same floor so that a brush 46 cooperating with the floor selector segments 42 through a circuit from alternating current supplied lead GN and rectifier 47 to relay LCD is not completed by the corresponding brush 48 of the same floor selector cooperating with segments 43 inasmuch as the inter-connecting rectifier is poled in reverse of rectifier 47. Relay LCD of each car is energized through its brush rectifiers 41 for landings below the effective position of the car and any brush 48 of any other car in a position below the position of the car under consideration, provided that other car is descending so that its down generator field relay DF closes contact DF at line 116 and the car has not picked

up a stopping signal so that its door closing relay contact CLS is closed at line 116. Brushes 46 and 48 are of sufficient length to span the separation of successive segments 42 and 43 so that a circuit for the LCD relays is maintained continuously even when the cars move. It will thus be seen that the lowest down traveling car which is not assigned to stop will have its lowest down car relay LCD dropped out while any other above the lowest car will have its LCD relay pulled in.

The energization of high priority call relay PEC closes a contact at line 121 to enable the emergency service relay ES of each of the cars. However, only the relay of the lowest down traveling car, not set to stop, will be energized inasmuch as only that car will have its LCD back contact at line 121 dropped out and its car starting relay CSA and down direction relay DL closed at line 121. The energization of relay ES closes its contact at line 115 to activate brush 48 for the car thereby appropriated to high priority service such that the lowest down car relays of all other cars are energized at all times. This insures that no other car can be appropriated to the high priority service since none of the ES relays for any of the other cars can be energized. In addition, relay ES causes the appropriated car to disregard all car and hall calls for floors which it will be required to pass in proceeding to the high priority call by opening back contact ES at 136 in the down call pick up circuit of the landing signal stopping relay S and by opening the car call stopping circuit to vernier stopping sequence relay SC through back contact ES at 155. Once the car proceeds below the second floor, the above main floor relay AMF is deenergized to close back contact AMF at 137 around the open emergency service contact ES at 136 in the landing signal stopping relay circuit whereby the stopping circuit can be rendered effective upon the engagement of brush 49 with the basement segment at 143 of the down hall call stopping segments 51. This stopping circuit is completed by virtue of the closed PEC contact at line 144. Down hall calls at the main landing are rendered ineffective at this time inasmuch as PEC back contact at 142 is opened.

The car is stopped through the sequence involving the operation of relay S at 135 as described in detail in the aforenoted Burgy application through the circuit from alternating current supplied lead GN comprising contact PEC at 144, segment 51 at 143, brush 49, back contact AMF at 137, down field relay contact DF at 136, second advance motor stopping relay back contact VR2, load by-pass relay back contact LBP, third rheostat relay contact RH3, by-pass relay contact BP, operating coil S and brake relay contact BK all at line 135. Operation of relay S initiates the stopping sequence as outlined above through closure of its contact at line 152 to energize relay V at 153. Relay V energizes advance motor stopping relay VR (not shown) to close its contact at line 122. At this time, the crosshead of the appropriated car has carried its brush 35 in FIG. III into engagement with the basement segment 52 at 148 to pull in the basement relay BR and close its contact at line 122, thereby completing a circuit for priority floor holding relay BH. BH closes its contact at line 111 in the reset circuit of latch relay PEC to release that relay from its energized position and reset all of the circuits associated therewith. However, at this time, the opening of contact PEC at 144 is ineffective to interrupt the energization of stopping relay S inasmuch as advance motor stopping relay VR1 operated by relay VR in a manner not shown has been closed to complete a sealing circuit for the stopping relay at line 131 through contacts VR1 and S. Thus, the stopping relay remains energized until the car fully stopped and the brakes set so that contact BK at 135 is permitted to open.

Registration of a high priority call actuates an indicator such as an illuminated sign bearing the legend "Emergency Call" which is located in the car and/or the master control panel. The indicator circuit is completed through contact PEC at 201 and either of contacts ES or DX at 201, depending upon how the car is selected for high priority service.

At this time, the car has been brought to the floor for which the high priority call has been registered, has been stopped at that floor and in the process of stopping has opened its doors. It is held at that floor with its doors open by the relay BH so long as it is energized. In the event that the high priority call was falsely registered, the car is released after an interval suitable for the normal initiation of car utilization in a high priority operation by the dropping out of priority floor holding relay BH through operation of its release timer BHT at line 123. Ordinarily, the car would be appropriated for high priority service by manually operating its group service switch 39 located in the car or at the landing from which high priority calls are registered at line 167 to drop group service relay GS. This drops by-pass relay BP at line 172 by virtue of the open contact GS in that line to prevent operation of the hall call stopping circuits inasmuch as contact BP at 135 will be opened. The car call stopping circuits remain effective through relay SC at 155 since relay ES was reset as the car initiated its slowdown at the floor for which the high priority call was registered and opened its car starting relay contact CSA at line 121. At this time car direction is set for upward travel by the usual operation of direction throwover switch RL at the limits of travel. Thus, relay DL is dropped out and contact DL at 121 is also opened. The dropping of relay GS opens contact GS at 123 to drop the priority floor holding relay BH at 122 by breaking its holding circuit. Thus, the car starting circuit which was broken at back contact BH in line 182 is re-established by the closing of that contact. Starting of a car on high priority service is accomplished manually as by means of push buttons in the car operating circuits embraced in the rectangle 59 as shown in the aforenoted Burgy application.

In the event that additional high priority service is required after the car departs from the basement, the maintenance of the car out of group service by the continued deenergization of its GS relay permits continued operation in response to car buttons, car direction being reversed at the terminals automatically and at intermediate floors by manual operation of direction control buttons, not shown, which are provided within the car.

The car starting circuits of FIG. VI operate much in the manner as that described for priority service. Since the car is not in group service, contacts MG and MG1 at line 181 are closed to by-pass the special floor start controls. The timer in block 59 which normally determines the interval the car stands at intermediate floors is inoperative when relay GS drops out. A manual control in the car supersedes the timer control. The car stops at the car calls in a conventional manner while on high priority service.

Had the car been appropriated to serve a falsely registered high priority call, it would have been returned to normal operation a suitable interval after it arrived at the high priority landing. While the car is in group service and upon its effective arrival at the high priority landing, relay BHT is energized through the closed GS and BH contacts at 123. Relay BHT is a slow pull-in type timer set for some interval suitable for the initiation of utilization of the car for priority service such that if a car is not removed from group service within that interval, BHT times out to open its back contact at line 122, thereby dropping priority floor holding relay BH to permit the car to return to normal operation. On the other hand, if a car is placed in priority service by the dropping of its GS relay, it can be returned to normal service only by the manual restoration of group service switch 39 to the close position to pull in relay GS.

While on high priority assignment, a car responds to car calls in the conventional manner described in the

aforenoted Burgy application inasmuch as back contact ES at 155 is closed. Thus when one of the buttons within the car for a particular floor is closed as at lines 151 through 156, the ascending car travels upward until its brush 52 engages the segment 53 for the floor having a button controlled contact closed to connect it to the lead Y, whereupon relay SC is energized to close its contact at line 151 and initiate the car stopping circuit through the actuation of relay V.

Had no car been conditioned for travel to the high priority call and in the zone of floors sufficiently proximate to the call to serve it expeditiously, the system would endeavor to start a car from the lower dispatching floor to run to the high priority call. For example, a system having cars operating at 500 feet per minute can advance a moving car about ten landings in the same time it can close the doors of a stopped car, start that car, and cause that car to travel between adjacent landings assuming the stopped car encountered no interference such as might be imposed by passengers holding the door.

The present system illustrates a lowest down car circuit which is effective over the entire car travel. In the event no car operates its emergency service relay ES, as where no car is traveling downward, when a high priority call is registered, any car at the lower terminal and in the selected status is appropriated for high priority service. A selected car is appropriated rather than a car conditioned to receive passengers, an "up load car," since the passengers in a "load car" might interfere with the travel to the high priority call. The selected car is made responsive through the operation of relay DX at 150 which is energized upon registration of a high priority call to close contact PEC at 150 if no car operates its emergency service relay to open its contact ES(A), ES(B) or ES(C) for cars A, B or C respectively. Operation of DX which is common to all of the cars starts the selected car at the lower dispatch floor by energizing its individual basement floor control relay MDB at 199 through the closure of contact DX at 199 since the selected car has its lower terminal selection relay CUN energized to close contact CUN at 199. Relay MDB starts the car to the high priority call in the basement in the same manner a basement call causes a selected car to institute basement service in the aforenoted Burgy application. The car is stopped through the landing signal stopping circuits in the manner described and otherwise follows the high priority call operation set forth above.

If car travel is so great that a car traveling toward a high priority call is too remote to expeditiously respond, the car appropriation can be arranged with a preference first for approaching cars in a zone of floors proximate to the call, second for a selected car at the nearest dispatching floor or a stopped car near the call, and third for an approaching car outside the zone of floors proximate to the call. Such combinations and variations can readily be constructed by one skilled in the art from the above disclosures.

It is to be appreciated that the above examples of a priority call service arrangement integrated with group operation of elevators is not to be read as limiting the present invention and that many variations from the disclosure can be undertaken without departing from its spirit and scope. For example, high priority service might be employed without the conventional priority service or it might be provided for a plurality of floors as opposed to but one floor. Further, such service could be arranged for a floor at or near the upper limit of travel in which case it would be desirable to appropriate the highest ascending car below the landing for which the high priority call is registered. Further, a high priority call might be arranged for an intermediate landing wherein a car might be appropriated from either side of the landing, such that the highest ascending car below and/or the lowest descending car above are caused to proceed directly to the landing to provide the necessary service.

The priority service shown integrated with high priority service might be supplied individually and be effective either from all floors served by the cars or a limited number of such floors. In each form of service the car selected is removed from regular service so that it will not respond in the manner of other cars of the group to hall calls. The high priority car by-passes all calls and proceeds to the high priority call where it is withheld from regular service by relay BH. A priority car is removed from service upon operation of relay SCR as it approaches the priority call since CTO transfers it to priority service. Where car travel is expedited to a priority call as in the high priority call example, it is contemplated that the traveling car appropriation circuits might be limited to a range of floors in proximity to the car in the event that a stopped car was in proximity to the landing for which the call was registered. Thus, in the event the car operation was such that a car could be started from the lower terminal downward to the priority call in the basement and reach that call faster than a down traveling car which was located above the tenth floor, the circuits might readily be arranged to start a car at the main landing and subject to the dispatcher to respond to the high priority call rather than appropriate a down traveling car above the tenth floor to respond to that call. Inasmuch as the circuits for accomplishing the above results are considered to be obvious to one skilled in the art from the above disclosures the details of such circuits in the suggested combinations have not been shown. However, it is intended that the invention embrace such variations as well as others involving different combinations of the features described.

We claim:

1. An elevator system including a plurality of cars serving a plurality of landings, car call registering means within each car for each landing served by said car for causing said car to stop at landings for which car calls are registered, hall call registering means at each of a plurality of landings served by said cars for causing any one of a plurality of said cars to stop at landings for which hall calls are registered, means actuated independently of said car and hall call registering means for registering calls for priority service at a predetermined landing for which car and hall call registering means are provided, means responsive to actuation of said priority call registering means for selecting that car of said plurality most favorably conditioned to provide priority service at said predetermined landing, means responsive to actuation of said priority call registering means for stopping the selected car at said predetermined landing, and means responsive to the selection of a car by said selection means for barring the response of said car to actuated call means, whereby said selected car serves said priority service prior to all other elevator service requirements.

2. A combination according to claim 1 wherein said means for selecting a car selects the first car capable of serving said predetermined landing to approach said predetermined landing.

3. A combination according to claim 1 including sensing means for each of a plurality of said cars which is actuated for said car most proximate to and traveling toward said predetermined landing in a range of travel including landings at which said car can be stopped by said car call and hall call registering means, wherein said means for selecting a car selects the car having its said sensing means activated.

4. A combination according to claim 1 including means for each car to park said car at a landing, said means for selecting a car selects a car having its parking means activated, and means for starting toward said predetermined landing a selected car which had its parking means activated at the time it was selected.

5. A combination according to claim 1 including first means for each car to park said car at a landing, second means for each of a plurality of said cars which is ac-

tuated for said car most proximate to and traveling toward said predetermined landing in a range of travel including landings at which said car can be stopped by said car call and hall call registering means, wherein said selecting means selects that car having said second means actuated and in the absence of an actuated second means that car having its first means actuated and means for starting toward said predetermined landing a selected car which had its parking means activated at the time it was selected whereby a car traveling toward said predetermined landing has a first preferred priority service condition and a car conditioned for parking has a second preferred priority service condition.

6. A combination according to claim 1 including means individual to each of said cars for cancelling the registration of car cells by said car call registration means, and means responsive to actuation of said selection means for actuating said car call cancelling means for said selected car.

7. A combination according to claim 6 including means responsive to the effective presence of said selected car at said predetermined landing for deactivating said car call cancelling means for said selected car whereby said selected car is rendered responsive to calls registered on said car call registering means subsequent to the arrival of said car at said predetermined landing.

8. A combination according to claim 1 including means actuated by imposition of requirements for priority service on said selected car subsequent to the arrival of said selected car at said predetermined landing, a timer for sensing the absence of actuation of said priority service requirement means for a predetermined time interval, and means for enabling said selected car to be released by said selecting means and to respond to said car and hall call registering means in response to the sensing of said predetermined time interval by said timer.

9. A combination according to claim 1 wherein said plurality of landings includes a dispatching landing, first means for conditioning each car at said dispatch landing to receive loads, second means for conditioning each car at said dispatch landing as next to be conditioned to receive loads when said first means for another car is actuated, sensing means for each of a plurality of said cars which is actuated for said car most proximate to and traveling toward said predetermined landing in a range of travel including landings at which said car can be stopped by said car and hall call registering means, said means for selecting a car selecting the car having its sensing means activated and in the absence of an activated sensing means selecting the car having said second conditioning means activated, and means for causing said selected car to travel directly to said predetermined landing.

10. A combination according to claim 1 including control means common to a plurality of said cars for correlating the operation of said cars as a group, means for each car for isolating said car from said control means to enable said car to be operated independently of the remaining cars of said plurality, means responsive to the arrival of said selected car at the landing for which said priority call is registered for preventing the starting of said car from said landing in response to said group control means, manually operative means actuating said isolating means to remove said selected car from group service, and means responsive to the removal of said car from group service for rendering said start preventing means inoperative.

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