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2 Sheets-Sheet 2

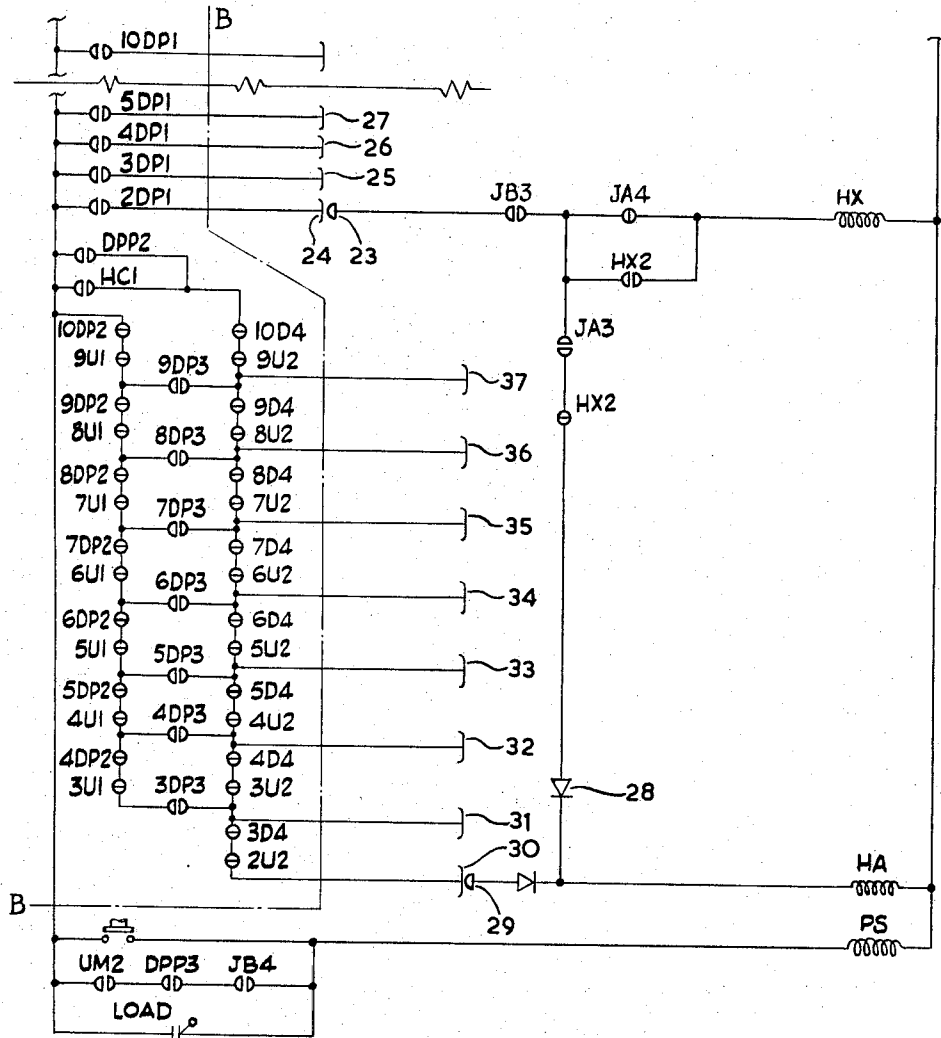


FIG. 3

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1

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PRIORITY CALL CONTROL FOR AN ELEVATOR SYSTEM

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ABSTRACT OF THE DISCLOSURE

An elevator dispatching and control system in which a predetermined number of calls are selected as priority calls and cars are assigned on a rotational basis to these priority calls. The assigned cars stop and reverse direction at the selected priority calls and the priority of all calls with lower priority than an answered call is advanced when the answered call is cancelled.

This invention relates to an improved dispatching and control system for a plurality of elevators acting in concert and more particularly to an improved control system for a bank of elevators operating on a priority call basis at heavy down-call periods.

The prior art has provided a number of devices for coping with periods of heavy traffic in elevator systems. Certain controls have been devised to answer a signal in priority to others if a predetermined time has elapsed and the signal has not been answered. Many attempts have been made to speed up service in peak traffic periods by reducing the number of stops made by a car and by increasing the number of passengers picked up by any one car. Thus, in the Crane U.S. Patent No. 2,664,971 a control for an elevator system is described by which the number of stops made by a car of an elevator system is reduced while at the same time the average number of passengers picked up at each stop is increased.

The system described in this Crane patent suffers, however, from a number of disadvantages. Thus, during the time that any one car is ascending to answer priority calls (hereinafter called prior calls), the prior calls can be cancelled by the other cars in the group. Each new prior call could be below the ascending car and at the instant that the last prior call above the ascending car is cancelled the ascending car stops and reverses direction at the next floor which it approaches. If there is no call registered for that floor it is a wasted stop. Also, with this Crane system each ascending car reverses at the highest prior call and if, after any one car reverses, the prior calls below are cancelled by other cars in the groups, this one car will answer only the call at which it reversed and will express through to the lower terminal, even if almost empty. Although this Crane patent teaches that by the system described therein it is impossible for a prior call to be unanswered, it is found that if cars are loaded enough to operate the automatic by-pass switch a prior call at a lower floor can be repeatedly by-passed.

By the elevator control system described hereinafter improved down peak service is attained by eliminating reversal of cars at a floor where there is no call, reducing the number of cars expressing to the lower terminal almost empty and giving each hall call an equal opportunity of being answered by an empty car.

It is an object of the present invention to provide improved service in an elevator system during periods of heavy down traffic.

It is another object of the invention to provide a novel control system for a bank of elevators which eliminates useless stops, improves priority service and increases the

2

average number of passengers picked up at each stop during heavy traffic periods.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing in which:

FIGURE 1 shows schematically a portion of an elevator system embodying the present invention which is a circuit for registering a down call at the seventh floor of a building and for recording its priority relative to all other down calls;

FIGURE 2 illustrates another circuit of the same elevator system for assigning instructions to cars on a rotational basis; and

FIGURE 3 depicts a third circuit of the same system for reversing cars at the lowest, second lowest, or highest prior call in the building.

In the embodiment of the invention described in conjunction with the accompanying figures of drawing it is assumed that the building has ten floors above the ground floor, but the elevator system described can, of course, be used for buildings with more or fewer floors. In order to simplify the description, connections for only a single upper floor are shown with certain associated circuits which are common to all floors. Only circuits connected for the "down" button are shown, although, obviously, a similar system could be used for giving priority to "up" signals at the various floors.

Referring now to the drawing, as aforementioned, FIGURE 1 shows a circuit for registering a down hall call at the seventh floor and for recording its priority relative to all other down hall calls. The circuit for other floors is similar. This circuit is common to a particular floor and to all cars. The circuit of FIGURE 1 utilizes a stepping switch 7DQ, the working of which is well known in the art and is clearly described in the Crane U.S. Patent No. 2,664,971. The present novel control system uses an entirely different circuit to that described in the aforesaid Crane patent. It is to be noted that in the circuit shown in FIGURE 1 the stepping switch 7DQ has three groups of contacts or "levels" designated on the drawing as level A, level B and level C. Each level has a "dummy" or normal contact designated as AN7, BN7 and CN7, respectively, in FIGURE 1. The additional contacts for level A are A1, A2 . . . A10, for level B are B1, B2 . . . B10 and so on. The wipers of the stepping switch are designated WA7, WB7 and WC7, respectively. The wipers are mounted on a shaft 12 for synchronous rotation with a cam 13 mounted on the same shaft 12 operating a switch 14. Connections X1 to X10 inclusive are attached to similarly marked wires on all other stepping switches.

Describing the operation of the circuit shown in FIGURE 1, assume the stepping switch 7DQ is in its normal position, i.e., with the wipers on the normal contacts AN7, BN7 and CN7. Assume also that, at a time when no down hall calls are registered, a down call is made at the seventh floor by a registering means such as by a down button 15. If there is no descending car at the seventh floor when the button 15 is pushed with a normally open down-cancel contact CND1 closed, a relay 7D will be energized through the button 15 and a resistor 7R1. The relay 7D will be self-holding through a normally open contact 7D1.

Coil 7DQC of the stepping switch 7DQ is energized through a normally open contact 7D2 and a normally closed interrupter contact 7DQ1. As the armature of the stepping switch 7DQ moves to the energized position, the interrupter contact 7DQ1 will open the circuit to the coil 7DQC. With the coil 7DQC de-energized, a spring-driven ratchet (not shown) will advance the wipers WA7, WB7 and WC7 to their first positions A1, B1 and C1. This first step of the stepping switch 7DQ will cause

the switch 14 to close, thus making the circuit independent of the contact 7D2 through a line 16. The stepping switch 7DQ will continue to step, by the action of the interrupter contact 7DQ1, until the wiper WB7 makes connection with the contact B10. At this instant, the coil 7DQC of the stepping switch 7DQ will be energized through the contact B10, the wiper WB7, a normally open contact 7D3 and a resistor 7R2. The resistor 7R2 limits the amount of continuous current through the coil 7DQC. A resistor 7R3 connected in parallel with the coil 7DQC is provided for the purpose of providing arc suppression thereon to prevent burning of the contacts and the wipers of the stepping switch 7DQ.

Assume now that a down hall call is registered at the fourth floor. The circuit for a relay 4D at the fourth floor is similar to that shown for the relay 7D and the circuit for a fourth floor stepping switch 4DQ is similar to that shown for the stepping switch 7DQ in FIGURE 1. Although these circuits for the fourth and other floors are not shown in the drawing they will be referred to using similar identifying symbols as used for the seventh floor.

The operation of the stepping switch 4DQ is identical to the sequence outlined hereinbefore with the exception that the switch 4DQ will stop stepping when wiper WB4 contacts contact B9. Coil 4DQC of the switch 4DQ will remain energized through the wiper WA7 and the contact A10 of the stepping switch 7DQ, the contact B9 and the wiper WB4 of the stepping switch 4DQ, and a contact 4D3 and a resistor 4R2 in the circuit for the stepping switch 4DQ. The stepping switch 7DQ is now stopped with its wipers on position 10 and the stepping switch 4DQ is stopped with its wipers on position 9.

Assume now that a down hall call is registered at the ninth floor. The sequence of operation will be as outlined above with the exception that stepping switch 9DQ for the ninth floor will stop stepping when wiper WB9 makes connection with contact B8. Coil 9DQC for the ninth floor will remain energized through the wiper WA4 and the contact A9 in the circuit for the fourth floor stepping switch 4DQ and contact B8, the wiper WB9, a contact 9D3 and a resistor 9R2 in the circuit for the ninth floor stepping switch 9DQ.

As can be seen, then, from the foregoing description, by the operation of the stepping switches for each floor, the order of registry of down hall calls will be recorded.

The operation of the FIGURE 1 circuit when a car answers the seventh floor down hall call will now be outlined. As a car stops at the seventh floor in answer to the call a sliding contact 17 makes connection with a stationary contact 18 and, when the cancel contact CND1 closes, the relay coil 7D is shorted out, thereby dropping out the relay. As aforesaid, the stepping switch 7DQ was held at position 10 with its coil 7DQC energized through the resistor 7R2. When the relay 7D is de-energized the contact 7D3 opens, thereby de-energizing the stepping switch 7DQ. The spring-driven ratchet (not shown) causes the wipers WA7, WB7 and WC7 to move one step, which in this case returns the stepping switch 7DQ to the normal position with the aforesaid wipers resting on the contacts AN7, BN7 and CN7.

When stepping switch 7DQ moves from position 10 to the normal position the wiper WA7 moves off the contact A10. This removes the voltage from the contact B9 on all other stepping switches. Since, in the foregoing example involving down hall calls at the seventh, fourth and ninth floors, the coil 4DQC of the fourth floor stepping switch 4DQ was energized through the contact B9, the stepping switch 4DQ will be de-energized and the spring driven ratchet will move it to position 10. The coil 4DQC will once again be energized through the contact B10, the wiper WB4, the contact 4D3 and the resistor 4R2 in the circuit for the fourth floor stepping switch 4DQ. When the stepping switch 4DQ steps from position 9 to position 10 it de-energizes the coil

9DQC of the stepping switch 9DQ which was held energized through the contact A9 on the stepping switch 4DQ and the contact B8 on the stepping switch 9DQ. The switch 9DQ will then move to position 9 and it will remain energized through the wiper WA4 and the contact A10 on the stepping switch 4DQ and thence through the contact B9, the wiper WB9, the contact 9D3 and the resistor 9R2 in the circuit for the ninth floor stepping switch 9DQ.

In the case where a call which has lower priority than other calls is cancelled, the stepping switch which is associated with that call similarly will step, by means of its interrupter contact, until the switch 14 opens at the normal position for the particular stepping switch concerned. Each stepping switch waiting on a priority lower than that call will step forward one position to fill up the gap.

A coil of the down peak program relay DPP (not shown) is energized when a predetermined traffic condition is encountered. When the coil DPP is energized a normally open contact DPP1, shown in FIGURE 1, is closed and coils of the DP relays, such as relay 7DP shown in FIGURE 1, associated with all stepping switches which are sitting on positions 8, 9 and 10, will be energized through the contact DPP1, wiper WC and contact C8, C9 or C10 in level C or the third level of the stepping switch 7DQ. In the foregoing example, involving down hall calls at seventh, fourth and ninth floors, the relays 7DP, 4DP and 9DP are energized indicating that these three calls have highest priority and are therefore prior calls.

The working of the circuit shown in FIGURE 2, which operates to assign instructions to cars on a rotational basis, will now be described. In FIGURE 2 the connections above line A—A are individual for each car and the connections shown below line A—A are common to all cars. As a car arrives at a predetermined point in the hatch such as the lower dispatching floor or lower reversing floor a switch 19 is closed by a cam on the car, or by a contact on the selector, energizing a relay LF. A normally open contact LF1 then energizes a relay LFA. As the down bound car arrives at the predetermined point in the hatch a normally closed contact LF2 is seen to open an instant before a normally open contact LFA1 closes. This insures that if either relay JA or JB is previously energized, they will both be de-energized at the instant the contact LF2 opens.

It can be seen that relay J is energized through normally closed contacts JA2 and JB2. The relay J closes a normally open contact J1 when a car arrives at the lower reversing floor, thereby energizing coil JQC of a stepping switch JQ common to all cars and seen by the drawing to have two levels. At the same time, voltage will be applied to wipers AW and BW of the stepping switch JQ.

Assume that the stepping switch JQ is turned to be connected in position so that wiper AW is on a contact 1A and wiper BW is on a contact 1B. The relay JA is seen to be energized through the contact J1, the wiper AW, the contact 1A and a normally open contact J2 closed by the relay J. The relay JB is seen to be energized through the contact J1, the wiper BW, the contact 1B and a normally open contact J3, closed by the relay J. When the contact JA2 and/or the contact JB2 open by way of the relays JA and/or JB, the relay J is de-energized. When the contact J1 opens the stepping switch coil JQC is de-energized allowing a spring-driven ratchet (not shown) on the stepping switch to advance the wipers AW and BW to position 2 (2A and 2B). The relay JA remains energized through the contact LF2 or the contact LFA1 and its self-holding contact JA1 and, similarly the relay JB remains energized through its self-holding contact JB1. If an assigned car causes the switch 19 to close while the car is in the up direction the car will not be re-assigned because an up-direction contact UM1 will be closed by a relay UM (not shown) which is energized when the

car is going up. With the contact UM1 closed the JA and/or the JB relays cannot be de-energized during the instant that the contacts LF2 and LFA1 are both open.

When another car, or possibly the same car, closes the switch 19 it goes through the same sequence as outlined hereinbefore, in connection with FIGURE 2, except that, since the wipers AW and BW are contacting the contacts 2A and 2B, only the relay JB will be energized. The stepping switch JQ will step to position 3 (3A and 3B) and the next car to arrive at main will be assigned only the relay JA. This rotational assignment continues until the ninth car has been assigned. When the stepping switch coil JQC is de-energized and the wipers AW and BW step to position 10 (10A and 10B), the stepping switch JQ will immediately take another step by energizing its coil JQC through a normally closed interrupter contact JQ1, contact 10A and the wiper AW. When the contact JQ1 opens the switch JQ will step to normal position (NA and NB). A switch 20, operated by a cam 21 mounted on a shaft 22, upon which the wipers AW and BW are mounted, closes as the switch JQ moves to the normal position and the coil will then again be energized through the contact JQ1 and the switch 20. When the contact JQ1 opens this time the coil JQC is de-energized and the wipers AW and BW are spring-driven to position 1 (1A and 1B). By this operation it is possible to use a stepping switch whose number of contacts per level is not evenly divisible by the number of different assignments.

It is to be noted that a similar circuit can, of course, be designed using relays or transistors in place of a stepping switch. It is also to be noted that the number of assignment of prior calls can be more or less than three and the same instructions can be assigned to several cars within one complete cycle. Thus, for example, there can be four assignments made at any one time indicated by A, B, C and D and the order of the assignments could be, in rotation, A, B, A, C, B, D and so on.

Reference will now be made to the operation of the circuit shown in FIGURE 3 whereby cars are reversed at the lowest, second lowest or highest prior call or up hall call, whichever is higher, in rotational sequence. In FIGURE 3 the connections to the right of line B—B are individual for each car and those to the left of line B—B are common to all cars. Assume that during a period of heavy down traffic, with the DPP relay energized, an up-bound car has both the JA and JB relays energized. A sliding contact 23 on the selector will connect to contacts 24, 25, 26, 27 and so on, in numerical order. When a car reaches a floor corresponding to the lowest prior call, say at the fourth floor, a relay HA will be energized through a normally open contact 4DP1, closed by the call, the contact 26, the sliding contact 23, a contact JB3 and a contact JA3, closed by the JB and JA relays respectively, a normally closed contact HX2 and a blocking rectifier 28.

The relay HA causes the car to stop at that floor and reverse to the down direction (assuming no car call is registered for a higher floor), as in normal high call reversal which is well known in the art. The car will pass up hall calls during the up trip since bypass PS will be energized through normally open contacts UM2, DPP3 and JB4, closed by the UM, DPP and JB relays, respectively.

Assume now that the up bound car has the JB relay energized and the JA relay de-energized and that there are prior calls registered at the third, fifth and eighth floors. When the sliding contact 23 touches the contact 25, a relay HX will be energized through a normally open contact 3DP1, closed by the call, the contact 25, the sliding contact 23, the contact JB3 and a normally closed contact JA4. The relay HX remains energized through a normally open contact HX2, even after the contact JA4 opens, until the sliding contact 23 runs off the stationary contact 25. When the relay HX is energized, the relay JA is energized, as shown in FIGURE 2, through the nor-

mally closed contact LF2 and a normally open contact HX1, closed by the relay HX. The relay JA will then remain energized through the contact LF2 and its self-holding normally open contact JA1 (shown in FIGURE 2).

As the car approaches the fifth floor the sliding contact 23 will make connection with the contact 27. The relay HA will then be energized through a normally open contact 5DP1, closed by the call, the contact 27, the sliding contact 23, the contacts JB3, JA3, HX2 and the rectifier 28. Thus, the car with the JB relay energized and the JA relay de-energized will pick up the relay HA and reverse direction at the second prior call. During the up trip the bypass PS will be energized through the contacts UM2, DPP3 and JB4 and the car will, therefore, pass up hall calls.

Assume now that the up bound car has the JA relay energized and the JB relay de-energized. The right hand string of normally closed contacts shown in FIGURE 3 comprising 2U2, 3D4, 3U2, 4D4, 4U2, and so on, is the normal high call reversal circuit. During periods of heavy down traffic, when the DPP relay is energized, this circuit is modified so as to read only prior calls and up hall calls. This modification is accomplished by the left hand string of normally closed contacts shown in FIGURE 3 comprising 3U1, 4DP2, 4U1, 5DP2, and so on, and normally open contacts, 3DP3, 4DP3, 5DP3, and so on, joining these two strings of contacts.

Assume that the eighth floor down hall call is the highest prior call in the building and that there is no up hall call registered above the seventh floor. The aforementioned left-hand string of contacts will be opened by the opening of the contact 8DP2, so that there is no voltage on any contact below the contact 8DP2. The right-hand string of contacts may be opened above the contact 8D4, if a non-prior call is registered at the ninth or tenth floor, and it will definitely be opened by the opening of the contact 8D4. The normally open contact 8DP3, upon closing, will apply voltage to a stationary contact 36. It can be seen from the foregoing that all stationary contacts 30 to 35, inclusive, below the contact 36 will not have voltage applied to them. Thus, as the car proceeds upward the relay HA will be energized only when a sliding contact 29 makes connection with the stationary contact 36. Contacts on the relay (not shown) will cause the car to stop at the eighth floor (if no car call is registered for a higher floor) and reverse its direction.

If, while the car is travelling upward to answer the eighth floor prior call, the call is cancelled by another car, or an up hall call is registered at the eighth floor or higher, the car will operate on normal high call reversal, i.e., the right-hand string of contacts. Since the JB relay is de-energized with this car, the contact JB4 will be open and the car will have the relay PS de-energized on the up trip and it will answer up hall calls. Thus, the car that is assigned to reverse direction at the highest prior call is also conditioned to answer up hall calls. Furthermore, any up bound car assigned to a prior call which has been answered by another car and with any other prior calls past the travel of the assigned car also having been answered, will operate on normal highest call reversal without regard to priority. Thus, this condition can occur if a car goes above the highest prior call to answer a car call or up hall call or if all prior calls above an up bound car are cancelled by other cars.

A DPP2 contact shown in FIGURE 3, operated by the down peak program relay DPP assures that the group of elevators will operate on highest call reversal during periods of heavy down traffic. A contact HC1 in parallel with the contact DPP2, which is operated by a relay HC in a circuit not shown also assures that the elevators will operate on highest call reversal when desired.

It is to be observed that the JA and JB assignment relays can be used to give rotational instructions to the

cars other than those which have been specifically described. Thus, for example, the main floor up hall lantern or "This Car Up" signal can be made inoperative during down peak on all cars except those assigned to answer the highest prior call.

Various rotational instructions can be used during other traffic programs, e.g., some cars can be assigned on a rotational basis to bypass up and/or down hall calls during an up peak period.

When utilizing a similar system, in a manner obvious to one skilled in the art, for giving priority to "up" signals at various floors, cars assigned to the up hall calls would not, of course, reverse direction as described hereinbefore after answering the call. A system similar to that described herein can, of course, be used for up hall call priority where the dispatching floor might be above the up hall calls making the dispatching floor, then, the upper reversing floor.

It is to be noted that the circuit described in the Crane U.S. Patent No. 2,664,971 can be used in conjunction with the improved system of reversing cars described herein.

It is to be further noted that with the circuits illustrated and described herein the stepping switch which remembers priority and the circuit which assigns the JA and/or the JB relays to the cars are operating at all times, which is a practical form of operation. The circuit can be operated, however, so that the stepping switch circuit can be turned on by a clock at the time of day when the heavy down peak is expected or it can be automatically turned on by the down peak itself when it occurs or by any other predetermined condition.

It is to be also noted that in contrast with the aforementioned Crane U.S. Patent No. 2,664,971, which teaches a system whereby cars can answer only prior calls, the herein described novel control system conditions cars to reverse direction at assigned prior calls, but, once reversed, the cars will answer any down hall calls without regard to priority, until loaded.

What we claim as our invention is:

1. A priority control circuit for an elevator system with a bank of elevators and serving a plurality of floors which comprises a registering means for each floor for registering in the circuit a hall call for that floor in a first direction, a recording means in each floor circuit, responsive to said registering means, for recording the order of registry of calls in said first direction and the priority of any said call relative to any other said call, means for advancing the recorded priority of all said hall calls with lower priority than an answered call upon cancellation of said answered call, means responsive to the recording means and to a predetermined traffic condition for making a selection of hall calls in said first direction in order of registry as prior calls to which elevator cars are assigned, means common to all cars for the assignment of cars of the elevator system to said selected, prior calls from a dispatching floor on a rotational basis, means associated with said assignment means for causing the assigned cars to answer said selected, prior calls, means for energizing a pass relay on cars assigned to prior hall calls in said first direction to cause the cars to pass calls in the opposite direction, means for de-energizing said pass relay on a car assigned to the prior call registered at any particular moment farthest from the dispatching floor to allow said car answering said farthest call to answer hall calls in said opposite direction and means for changing the operation of any one car assigned to a selected prior call in said first direction to normal farthest call reversal upon cancellation by other cars of all selected prior calls beyond the travel of said any one car.

2. A priority control circuit for an elevator system with a bank of elevators and serving a plurality of floors which comprises a registering means for each floor for registering in the circuit a down hall call for that floor, a stepping

switch in each floor circuit, responsive to said registering means, for recording the order of registry of down hall calls and the priority of any one down hall call relative to any other down hall call, means for advancing the recorded priority of all down hall calls with lower priority than an answered call upon cancellation of said answered call, means activated by a predetermined traffic condition and responsive to the recording means for making a selection of down hall calls in order of registry as prior calls to which elevator cars are assigned, a stepping switch common to all cars for the assignment of instructions to cars of the elevator system to answer the selected down hall calls on a rotational basis, means associated with said assignment stepping switch for instructing and causing each assigned car to stop and reverse direction at the selected, prior down hall call to which said car is assigned, means for energizing a pass relay on cars assigned to prior down hall calls to cause the cars to pass up hall calls, means for de-energizing said pass relay on a car assigned to the highest selected prior down hall call registered at any particular moment to allow said car assigned to said highest prior call to answer up hall calls and means for changing the operation of any one car assigned to a selected, prior, down hall call to normal high call reversal upon cancellation by other cars of all selected, prior, down hall calls above said any one car.

3. A control circuit for an elevator system with a bank of elevators and serving a plurality of floors which comprises a registering means for each floor for registering in the circuit a hall call for that floor in a first direction, recording means, responsive to said registering means, for recording the order of registry of hall calls in said first direction and the priority of any said hall call relative to any other said hall call, means for advancing the recorded priority of all said hall calls with lower priority than an answered call upon cancellation of said answered call, means for the assignment of cars of the elevator system on a rotational basis to a predetermined number of said hall calls with recorded priority selected as prior calls, means for energizing the assignment means when a car arrives at the dispatching floor of the elevator system, means associated with said assignment means comprising combinations of relays, associated individually with each car and energized in rotational sequence, to operate the assignments in the sequence of the recorded priority of calls in said first direction and further means associated with said assignment means for causing an assigned car to answer a prior call to which it is assigned.

4. A priority control circuit for an elevator system with a bank of elevators and serving a plurality of floors which comprises a registering means for each floor for registering in the circuit a down hall call for that floor, a stepping switch in each floor circuit, responsive to said registering means, for recording the order of registry of down hall calls and the priority of any one down hall call relative to any other down hall call, means for advancing the recorded priority of all down hall calls with lower priority than an answered call, upon cancellation of said answered call, by the advancement of all stepping switches at floors where unanswered down hall calls with lower priority than the answered call are registered, means activated by the registration of a predetermined number of down hall calls responsive to the stepping switch recording means for making a selection of down hall calls in order of registry as prior calls to which elevator cars are assigned, a stepping switch common to all cars for the assignment of instructions to cars of the elevator system to answer the selected down hall calls on a rotational basis, means for energizing the assignment stepping switch when a car arrives at the lower reversing floor of the elevator system, means associated with said assignment stepping switch comprising combinations of relays, associated individually with each car and energized in rotational sequence, to operate the assignments in the sequence of the recorded priority of down hall calls, further means associated with

said assignment stepping switch for instructing and causing each assigned car to stop and reverse direction at the selected prior call to which it is assigned, means for energizing a pass relay on cars assigned to prior down hall calls to cause the cars to pass up hall calls, means for de-energizing said pass relay on a car assigned to the highest selected prior down hall call registered at any particular moment to allow said car assigned to the highest prior call to answer up hall calls and means for changing the operation of any one car assigned to a selected, prior, down hall call to normal high call reversal upon cancellation by other cars of all selected, prior, down hall calls above said any one car.

5. A control circuit for an elevator system with a bank of elevators and serving a plurality of floors which comprises a registering means for each floor for registering in the circuit a down hall call for that floor, a stepping switch in each floor circuit, responsive to said registering means, for recording the order of registry of down hall calls and the priority of any one down hall call relative to any other down hall call, means for advancing the recorded priority of all down hall calls with lower priority than an answered call, upon cancellation of said answered call, by the advancement of all stepping switches at floors where unanswered down hall calls with lower priority than the answered call are registered, means responsive to the recording stepping switch for selecting a predetermined number of down hall calls in order of registry as prior calls to which elevator cars are assigned, means for the assignment of cars of the elevator system to said selected prior calls on a rotational basis, and means associated with said assignment means for instructing and causing each assigned car to stop and reverse direction at the prior down hall call to which said car is assigned.

6. A control system for a bank of elevators serving a plurality of floors which comprises a registering means for each floor served for registering in the circuit a call for that floor in a first direction, recording means, responsive to said registering means, for recording the priority of any said call relative to all other calls in said first direction, means for advancing the recorded priority of all said calls with lower priority than an answered call upon cancellation of said answered call, means responsive to a predetermined traffic condition in the bank of elevators for selecting a predetermined number of calls in said first

direction in order of registry as prior calls, said selecting means being responsive to said recording means, means for assigning cars to said prior calls in rotational sequence and means for instructing and causing each assigned car to answer and reverse direction at a selected one of said prior calls.

7. A control circuit for an elevator system with a bank of elevators and serving a plurality of floors which comprises a registering means for each floor for registering in the circuit a down hall call for that floor, recording means, responsive to said registering means, for recording the order of registry of down hall calls and the priority of any one down hall call relative to any other down hall call, means for advancing the recorded priority of all down hall calls with lower priority than an answered call upon cancellation of said answered call, a stepping switch common to all cars for the assignment of cars of the elevator system on a rotational basis to a predetermined number of said down hall calls with recorded priority selected as prior calls, means for energizing the assignment stepping switch when a car arrives at the lower reversing floor of the elevator system, means associated with said assignment stepping switch comprising combinations of relays, associated individually with each car and energized in rotational sequence, to operate the assignments in the sequence of the recorded priority of down hall calls and further means associated with said assignment stepping switch for causing the assigned cars to stop and reverse direction at the prior down hall calls to which said cars are assigned.

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