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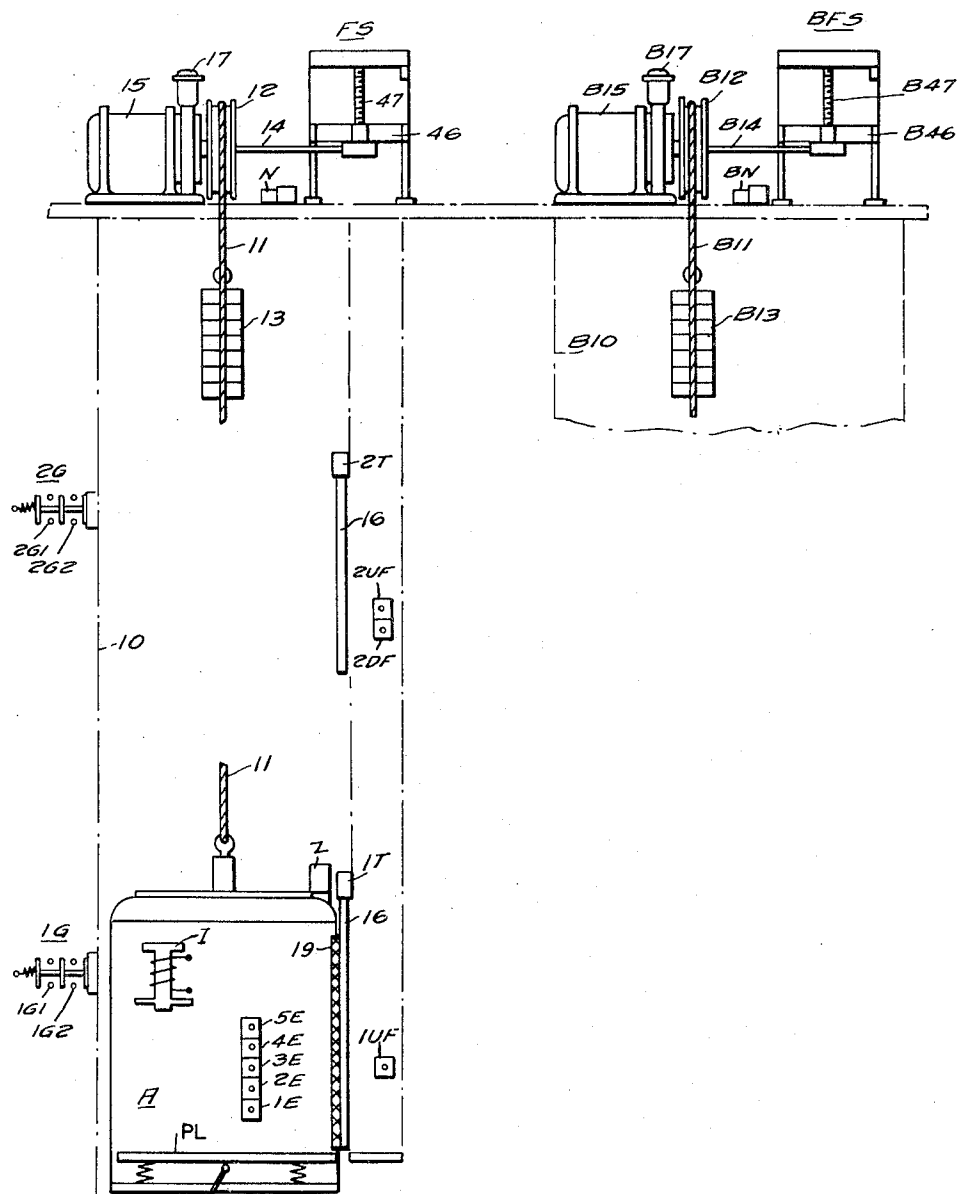
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ELEVATOR SYSTEMS

2,776,733

Filed June 2, 1955

5 Sheets-Sheet 1

Fig.1.



WITNESSES:

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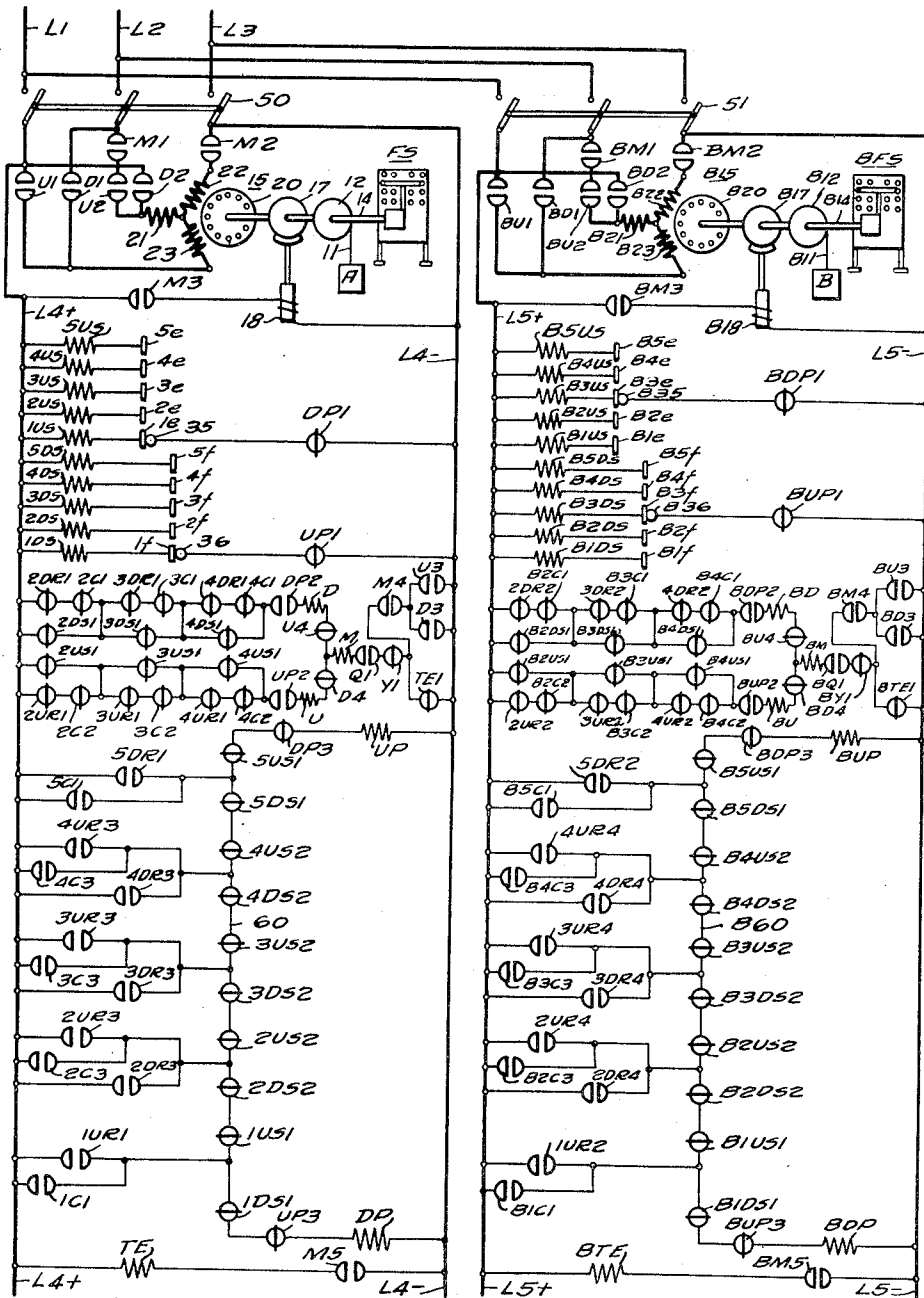
Jan. 8, 1957

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Filed June 2, 1955

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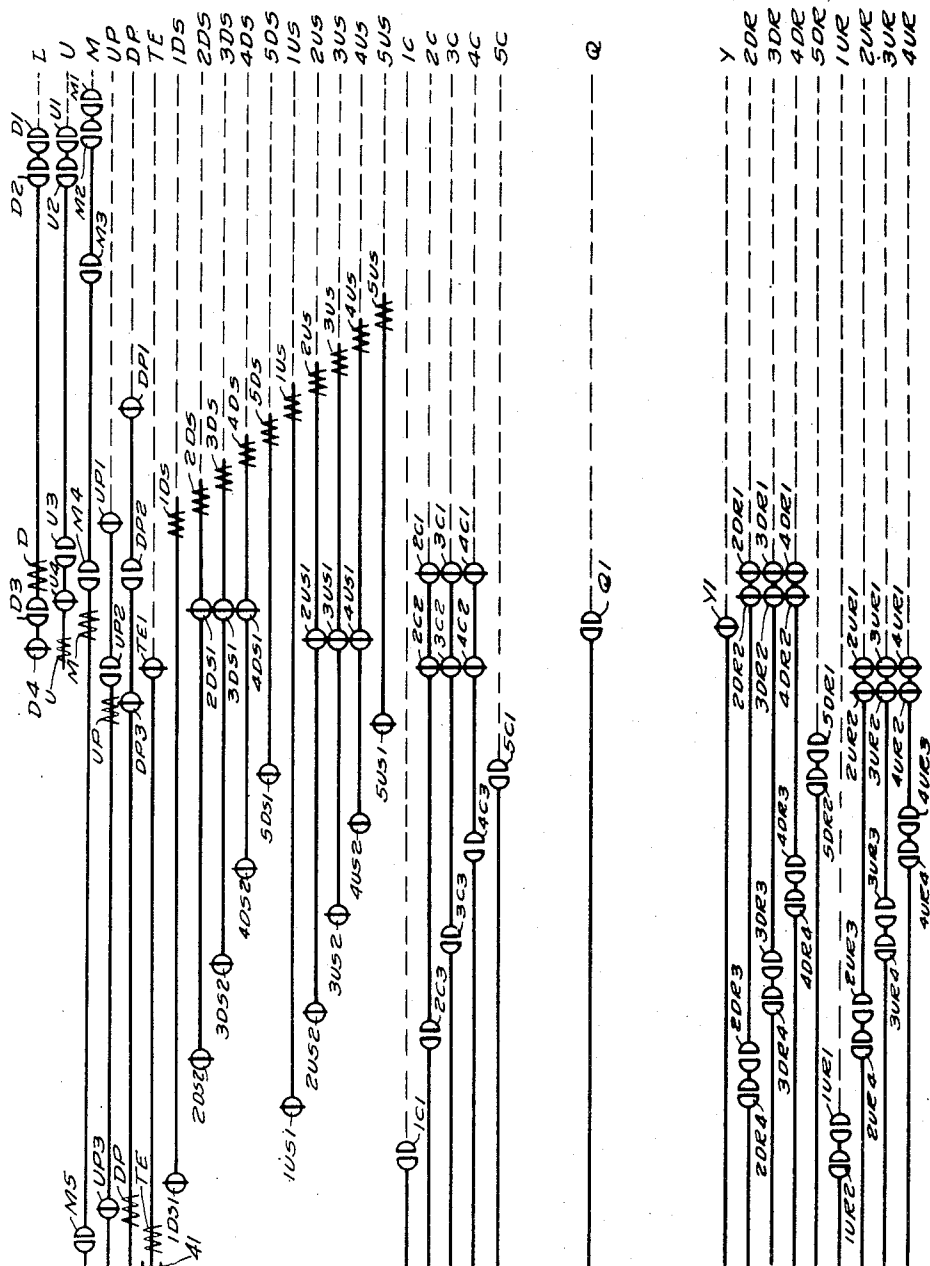
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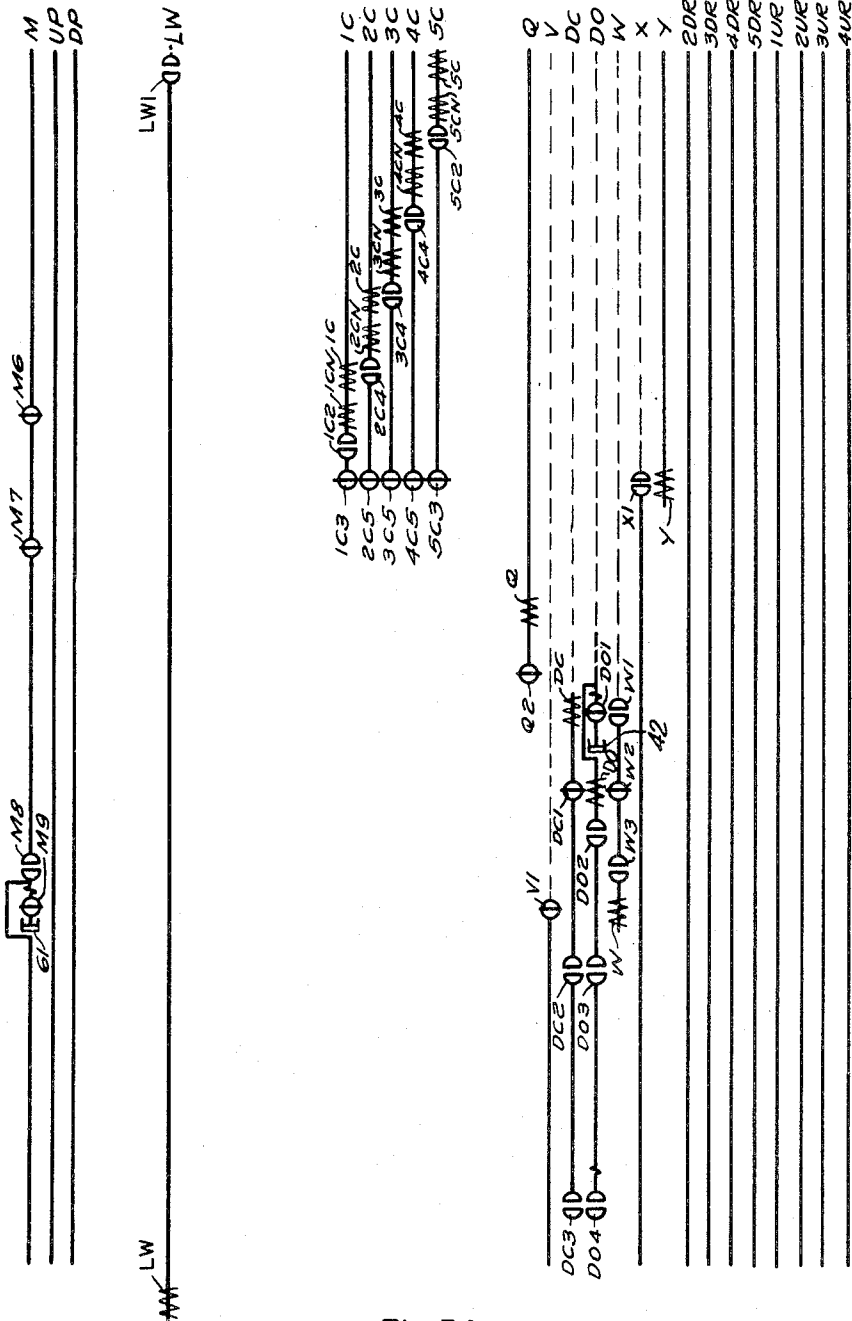


Fig. 3A.

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2,776,733

ELEVATOR SYSTEMS

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Application June 2, 1955, Serial No. 512,740

7 Claims. (Cl. 187—29)

This invention relates to elevator systems, and it has particular relation to automatic elevator systems wherein an elevator car stops at floors in response to operation of service controls or call means for floors desired by passengers within an elevator car.

The invention is applicable to elevator systems employing either a single car or a plurality of elevator cars arranged in a bank. The system may be of the type wherein each elevator car is parked when no call for service is registered. Alternatively, the elevator system may be of the type wherein each of the elevator cars is operated substantially continuously between terminal floors. In the latter case, if the elevator cars are arranged in a bank, the elevator cars may be dispatched from terminal floors by means of suitable dispatchers.

In an elevator system, it is possible for a passenger to interfere with the orderly and efficient operation of the system. For example, let it be assumed that the last passenger to leave an elevator car at a floor operates a service control or call means within the elevator car to register a car call for a floor served by the elevator car. During its next trip, the elevator car is forced to stop at such floor even though such stop does not contribute to the efficient operation of the system.

In accordance with the invention, the last passenger to leave an elevator car is prevented from registering within the elevator car a car call which is effective for controlling the operation of the elevator car. In a preferred embodiment of the invention, the removal of load from the elevator car operates to reset or cancel all car calls which are registered in the elevator car at intermediate floors.

It is, therefore, an object of the invention to provide an improved system for rendering ineffective car call means under predetermined conditions.

It is a further object of the invention to provide an elevator system wherein the departure of load from an elevator car operates to reset or render ineffective all calls registered within the elevator car.

Other objects of the invention will be apparent from the following discussion taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view in side elevation with parts broken away of an elevator system which may embody the invention;

Figs. 2 and 3 are schematic views showing control circuits in straight line form suitable for the system of Fig. 1;

Figs. 2A and 3A are schematic views or keys showing relays and switches employed in the circuits of Figs. 2 and 3. For groups of relays or switches having similar functions only representative members of the group are illustrated in some cases in Fig. 2A. If Figs. 2 and 3 are placed in horizontal alignment respectively with Figs. 2A and 3A, it will be found that corresponding coils and contacts of the relays and switches shown in the aligned figures are substantially in horizontal alignment.

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Features of applicant's invention may be employed in single car or multi-car systems which are designed to serve structures or buildings having various numbers of floors. In a multi-car system, the system may include any desired number of elevator cars arranged in a bank. However, in order to simplify the presentation as much as possible, the invention will be described with reference to the system shown in the Carney et al. Patent 2,172,187, which issued September 5, 1939. Insofar as possible, the conventions employed in the Carney et al. patent will be adhered to in the present discussion. Components of the Carney et al. system which are herein illustrated will be identified by the same reference characters employed in the Carney et al. patent. Additions or modifications will be identified, where possible, by asterisks.

Apparatus in Fig. 1

Figure 1 includes all components of Fig. 1 of the Carney et al. patent and the similar components of the two figures operate in identical manner. For this reason, a detailed discussion of the components is believed to be unnecessary at the present time. However, for convenience, the following components appearing in Fig. 1 are listed as follows:

- A—car
- 10—hatchway
- 11—cable
- 12—hoisting drum
- 13—counterweight
- 14—shaft
- 15—electric motor
- 16—hatchway door
- 17—brake
- 19—car gate
- 1E to 5E—car buttons
- 1T—first floor hatchway door motor
- Z—car gate motor
- N—control motor
- I—inductor relay
- IG, etc.—hatchway door motor switches
- FS—floor selector
- *WS—load-responsive switch

The asterisk indicates that a device for detecting the pressure of load in the elevator car has been added. In the specific illustration, a load-weighing switch WS has been added for the elevator car A. Each of the elevator cars of Fig. 1 has added thereto a similar load-responsive device and a load-weighing platform similar to the platform PL for the elevator car A. When a passenger enters the elevator car A the platform is deflected to close the switch WS. In the absence of load, this switch is open.

Apparatus in Fig. 2

The apparatus in Fig. 2 includes the following components which also appear in Fig. 3 of the Carney et al. patent:

- 18—brake coil
- 20—rotor
- 21, 22, 23—stator windings
- U—up-direction switch or relay
- D—down-direction switch or relay
- L1, L2, L3—conductors of source of electrical energy
- 1US to 5US—up-stopping relays
- 1DS to 5DS—down-stopping relays
- UP—up-preference relay
- DP—down-preference relay
- H—hesitating relay
- M—control-conditioning relay.

Fig. 2 is identical with Fig. 3 of the Carney et al. patent.

Apparatus in Fig. 3

The following components appear in Fig. 3:

1E to 5E—car buttons
 1C to 5C—holding coils
 1CN to 5CN—cancellation coils
 Y—auxiliary car preference relay
 I—inductor relay
 Q—door interlock relay
 55—car-door-safety contact members
 1-54 to 5-54—hatchway-door-safety contact members
 1TF to 5TF—field windings of door motors
 1TA to 5TA—armatures of door motors
 ZF—field winding of car-gate motor
 ZA—armature of car-gate motor
 NF—field winding of control motor
 NA—armature of control motor
 W—door control relay
 DC—door closing relay
 DO—door opening relay
 *LW—load relay.

Fig. 3 is identical with Fig. 4 of the aforesaid Carney et al. patent except that a load relay is added for each of the elevator cars, such as the relay LW for the elevator car A, as indicated by the asterisk. Since the various common relays of Fig. 3 operate in the same manner set forth in the Carney et al. patent, a detailed discussion thereof is considered unnecessary.

Fig. 2 and 5 of the aforesaid Carney et al. patent are not necessary for an understanding of the invention and are not here reproduced. However, these figures may be incorporated in the present system in the manner set forth in the Carney et al. patent.

Operation

Inasmuch as the aforesaid Carney et al. patent discusses the operation of many components of the system, it is believed that a brief discussion particularly directed to the additions to the Carney et al. system herein described will suffice.

It will be assumed that the elevator car A has stopped at the fourth floor and is fully loaded at such floor, and that intending passengers at the floor desirous of proceeding down were unable to enter the loaded elevator car. It will be assumed further that the passengers within the elevator car all desire to proceed to the first floor, and that the push button 1E (Fig. 1) is operated to register a car call for the first floor.

When the passengers entered the elevator car at the fourth floor, they deflected the load platform PL sufficiently to close the switch WS. In closing, the switch WS energized the load relay LW which closed its make contacts LW1. Consequently, the operation of the push button 1E completed with the make contacts LW1 an energizing circuit for the car call relay 1C.

The relay 1C when energized closes its holding contacts 1C2. In addition, the relay initiates the energization of the down-direction switch D and the control conditioning relay M (Fig. 2) in the manner set forth in the aforesaid Carney et al. patent for the purpose of moving the elevator car towards the first floor.

As the elevator car reaches the first floor, the down-direction switch D and the control conditioning relay M are deenergized in the manner set forth in the aforesaid Carney et al. patent to stop the elevator car at the first floor and open the doors of the elevator car. The passengers now start to leave the elevator car A.

It will be assumed that as the passengers leave, one of the passengers operates the push button 4E for the purpose of causing the elevator car A, during its next up trip, to stop at the fourth floor for the purpose of receiving the remaining passengers at the fourth floor. The

operation of the push button completes with the contacts LW1 an energizing circuit for the car call relay 4C which closes its holding contacts 4C4.

The registration of such a call is objectionable for the reason that the elevator car is forced to receive passengers at the fourth floor despite the fact that other passengers may have waited for a longer period of time for the elevator car, and despite the fact that efficient operation of the elevator car may require the car to proceed at least to the highest floor which it is conditioned to serve before it reverses to receive passengers desiring to proceed in the down direction.

As the last passenger leaves the elevator car A at the first floor, the platform PL (Fig. 1) moves upwardly sufficiently to permit the switch WS to open. The opening of this switch results in deenergization of the load relay LW (Fig. 3) which opens its make contacts LW1.

By inspection of Fig. 3 it will be noted that the opening of the make contacts LW1 completely interrupts the energizing circuit for the car call registering relays. Consequently, the registering relay 4C is reset and opens its holding contacts 4C4. Consequently, the invention prevents the assignment of an empty elevator car by operation of the car call registering relays to stop at any floor served by the elevator car.

The relay LW is effective at any floor to interrupt the energizing circuit for the call registering relays when the elevator car is empty and particularly is effective at intermediate floors. Thus if several passengers register car calls for different floors and all disembark at the first call reached by the elevator car, the remaining car calls are promptly canceled and unnecessary car travel is avoided.

Although the invention has been described with reference to certain specific embodiments thereof, numerous modifications falling within the spirit and scope of the invention are possible. Therefore, the embodiments shown in the drawings and described above are to be construed in an illustrative rather than in a limiting sense.

I claim as my invention:

1. In an elevator system, a structure having a plurality of floors including terminal floors and intermediate floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, call means operable for registering calls for floors desired by passengers within the elevator car and means responsive to a substantially unloaded condition of the elevator car at an intermediate floor for rendering the call means ineffective for registering calls.

2. In an elevator system, a structure having a plurality of floors including terminal floors and intermediate floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, call means operable for registering calls for floors desired by passengers within the elevator car, means responsive to a substantially unloaded condition of the elevator car at any of the floors for rendering the call means ineffective for registering calls, said last-named means being responsive to the presence of a predetermined load in the elevator car for rendering effective said call means.

3. An elevator system comprising a structure having a plurality of floors including terminal floors and intermediate floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, call means operable for registering calls for floors desired by passengers within the elevator car, and control means effective at least while calls are registered by the call means for moving the elevator car, for stopping the elevator car at each floor approached by the elevator car for which a call is registered by the call means, and for automatically restarting the elevator car following the lapse of a substantial time from each floor at which it stops, in combination with means responsive to a substantially unloaded

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condition of the elevator car at any of said floors for rendering ineffective said call means.

4. In an elevator system, a structure having a plurality of floors including terminal floors and intermediate floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, passenger detector means having a first condition when no passenger is in the elevator car, said detector means operating to a second condition in response to entry of a passenger into the elevator car, call means operable for registering calls for floors desired by passengers within the elevator car, and means responsive to operation of the detector means into the first condition while the elevator car is at an intermediate floor for rendering the call means ineffective for registering calls.

5. In an elevator system, a structure having a plurality of floors including terminal floors and intermediate floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, call means operable when in effective condition for registering calls for floors desired by passengers within the elevator car, resetting means effective subsequent to assignment of the elevator car to answer a call for a floor registered by the call means for resetting the call means to cancel the call registered for the last-named floor, and passenger-controlled means responsive to the passenger loading of the elevator car at any of the floors for controlling the effectiveness of said call means.

6. An elevator system comprising a structure having a plurality of floors including terminal floors and intermediate floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, call means operable for registering calls for floors desired by passengers within the elevator car, and control means effective at least while calls are registered by the call means for moving the elevator car, stopping the elevator car at each floor approached by the elevator car for which a call is registered by the call means, and automatically restarting the elevator car following the lapse of a substantial time from each floor at which it stops, in combination with means responsive to a substantially unloaded condition of the elevator car

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while the elevator car is at an intermediate floor for rendering ineffective said call means, and means responsive to presence of at least a predetermined load in the elevator car for rendering effective the call means.

7. In an elevator system, a structure having a plurality of floors including two terminal floors and a plurality of intermediate floors located between the terminal floors, an elevator car, means mounting the elevator car for movement relative to the structure for serving the floors, passenger detector means having a first condition when no passenger is in the elevator car, said detector means having a second condition as long as a passenger is within the elevator car, and control means for controlling the elevator car to move relative to the structure and to stop at preselected floors, said control means comprising first call means for each of the intermediate floors, said call means being operable from each of the intermediate floors for registering a call for such floor, second call means operable from within the elevator car for registering calls for each of the intermediate floors desired by passengers within the elevator car, stopping means effective for stopping the elevator car at each of the intermediate floors approached by the elevator car for which a call is registered by the call means which may be answered by the approaching elevator car without change in direction of travel, and modifying means effective while the elevator car is at one of the terminal floors and while the elevator car is displaced from the terminal floors provided that the passenger detector means is in the first condition for rendering the second call means ineffective for retaining a registered call, said modifying means while the passenger detector means is in the second condition being ineffective for modifying operation of the second call means.

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