Nov. 30, 1937. W. F. EAMES 2,100,736

ELEVATOR SIGNALING SYSTEM

Filed July 16, 1935 5 Sheets-Sheet 1

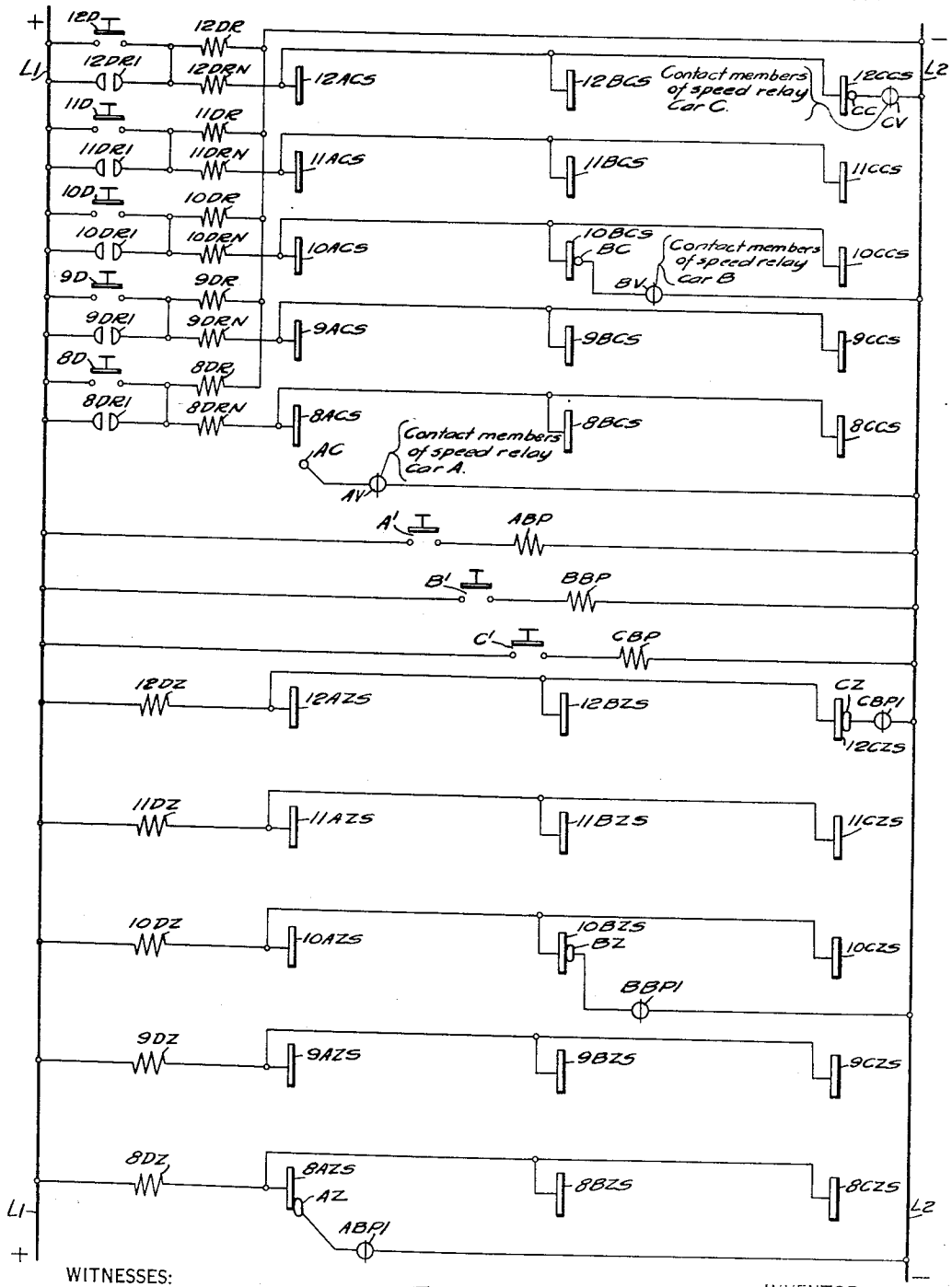


Fig. 1.

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ELEVATOR SIGNALING SYSTEM

Filed July 16, 1935 5 Sheets-Sheet 2

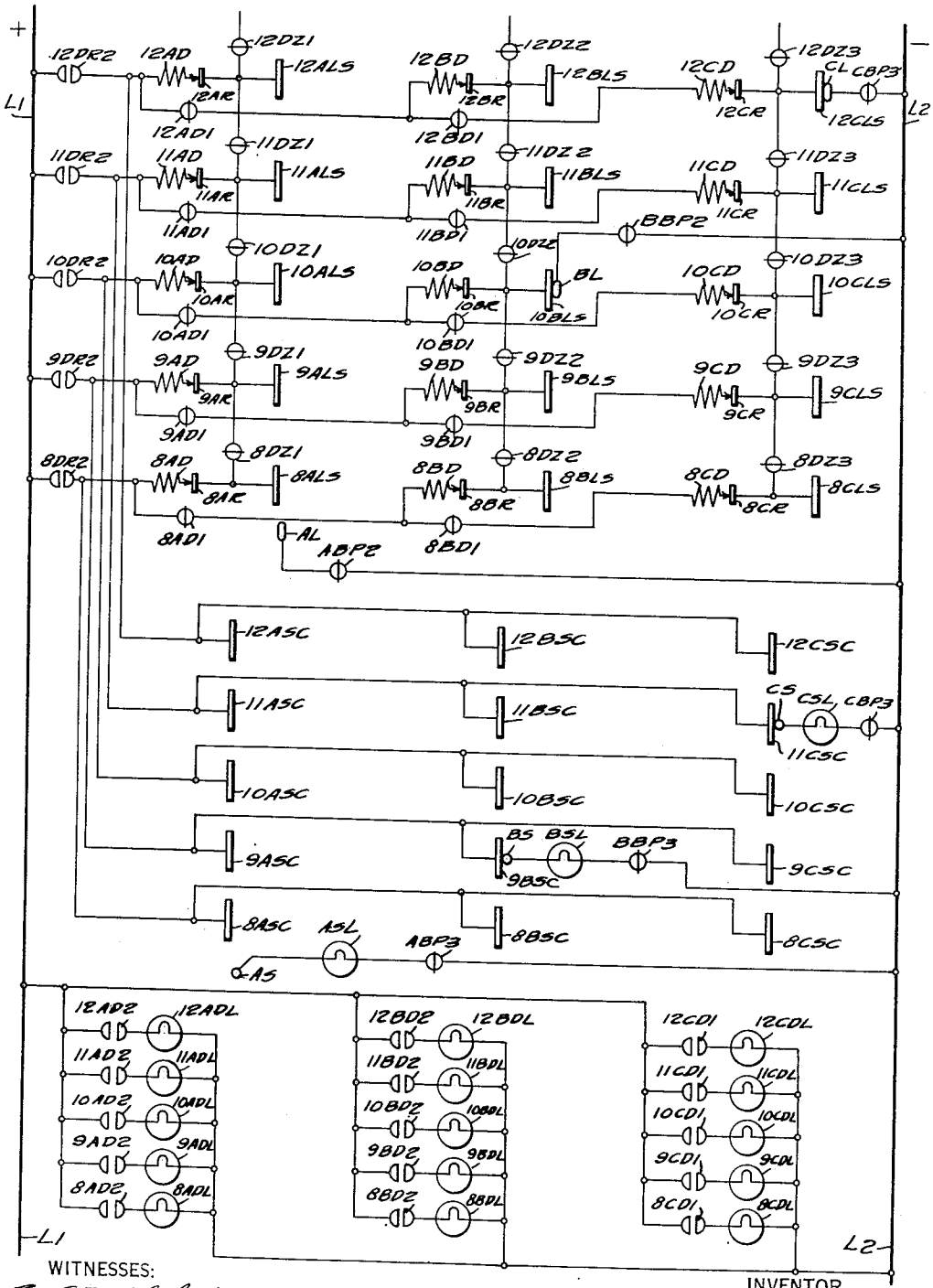


Fig. 2.

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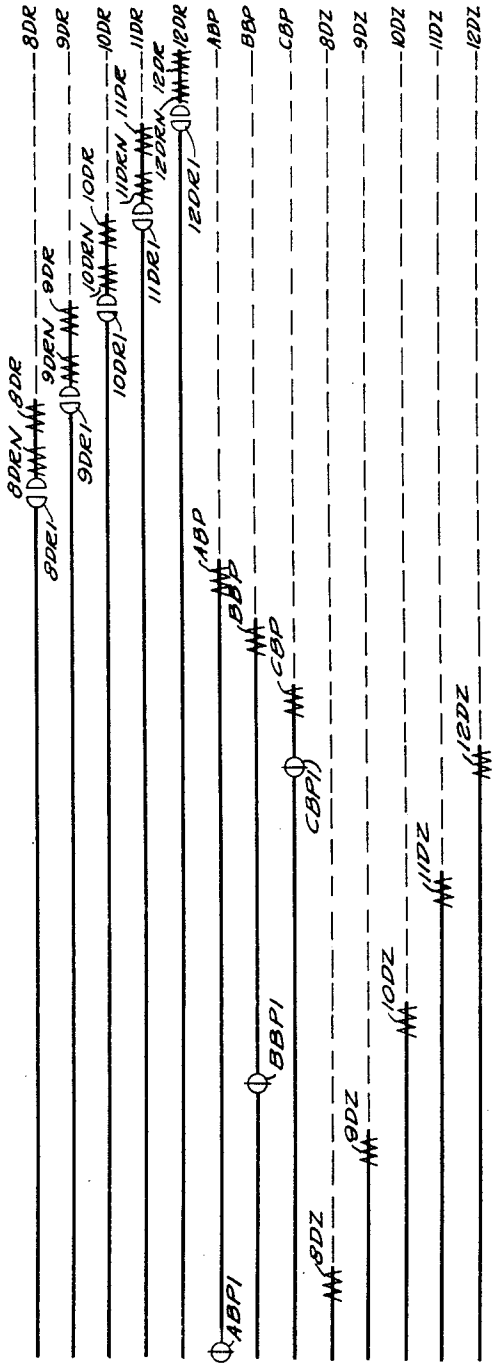
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ELEVATOR SIGNALING SYSTEM

Filed July 16, 1935 5 Sheets-Sheet 3



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Fig. 3.

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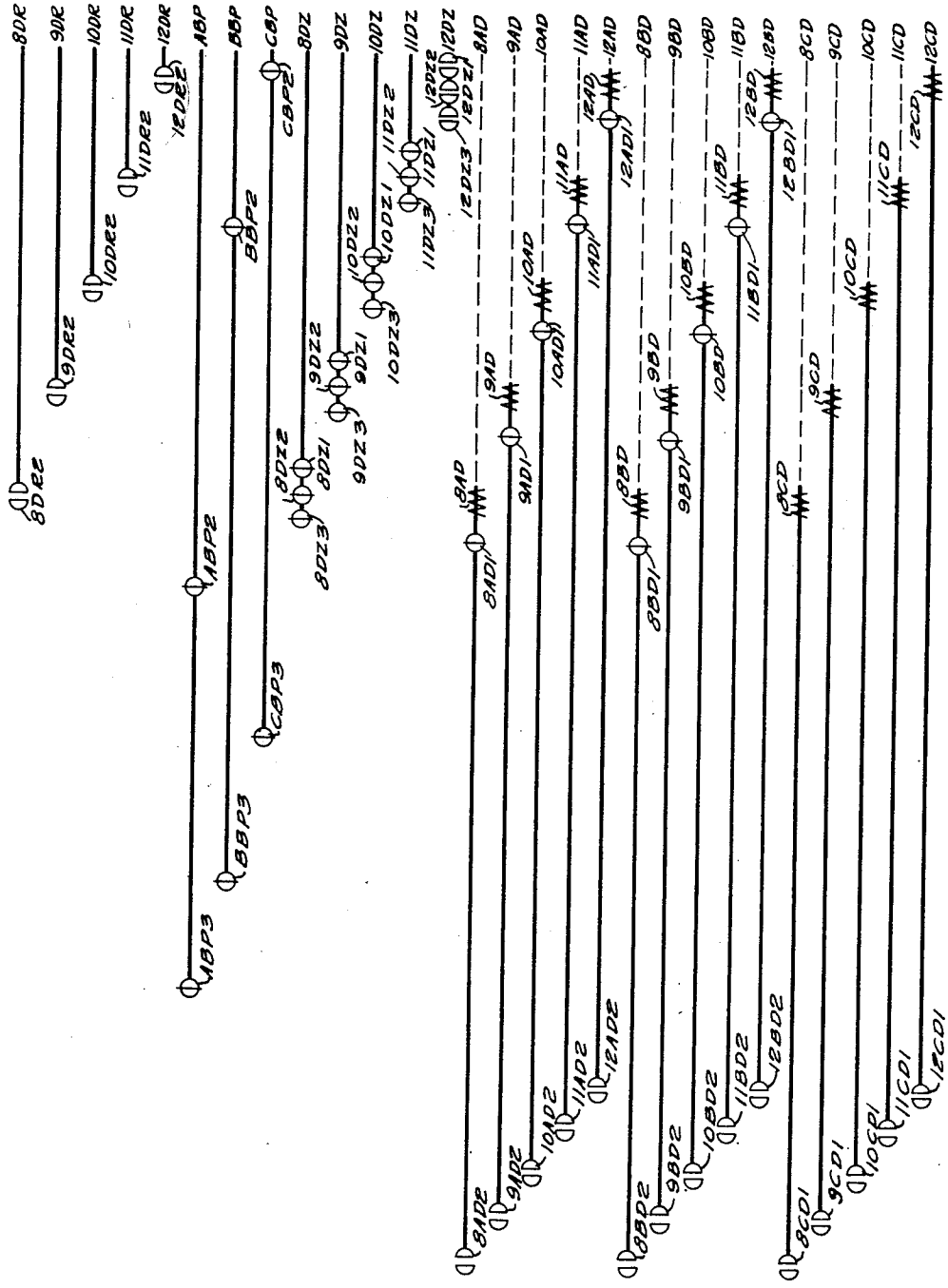
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Nov. 30, 1937. W. F. EAMES 2,100,736

ELEVATOR SIGNALING SYSTEM

Filed July 16, 1935 5 Sheets-Sheet 4



WITNESSES:
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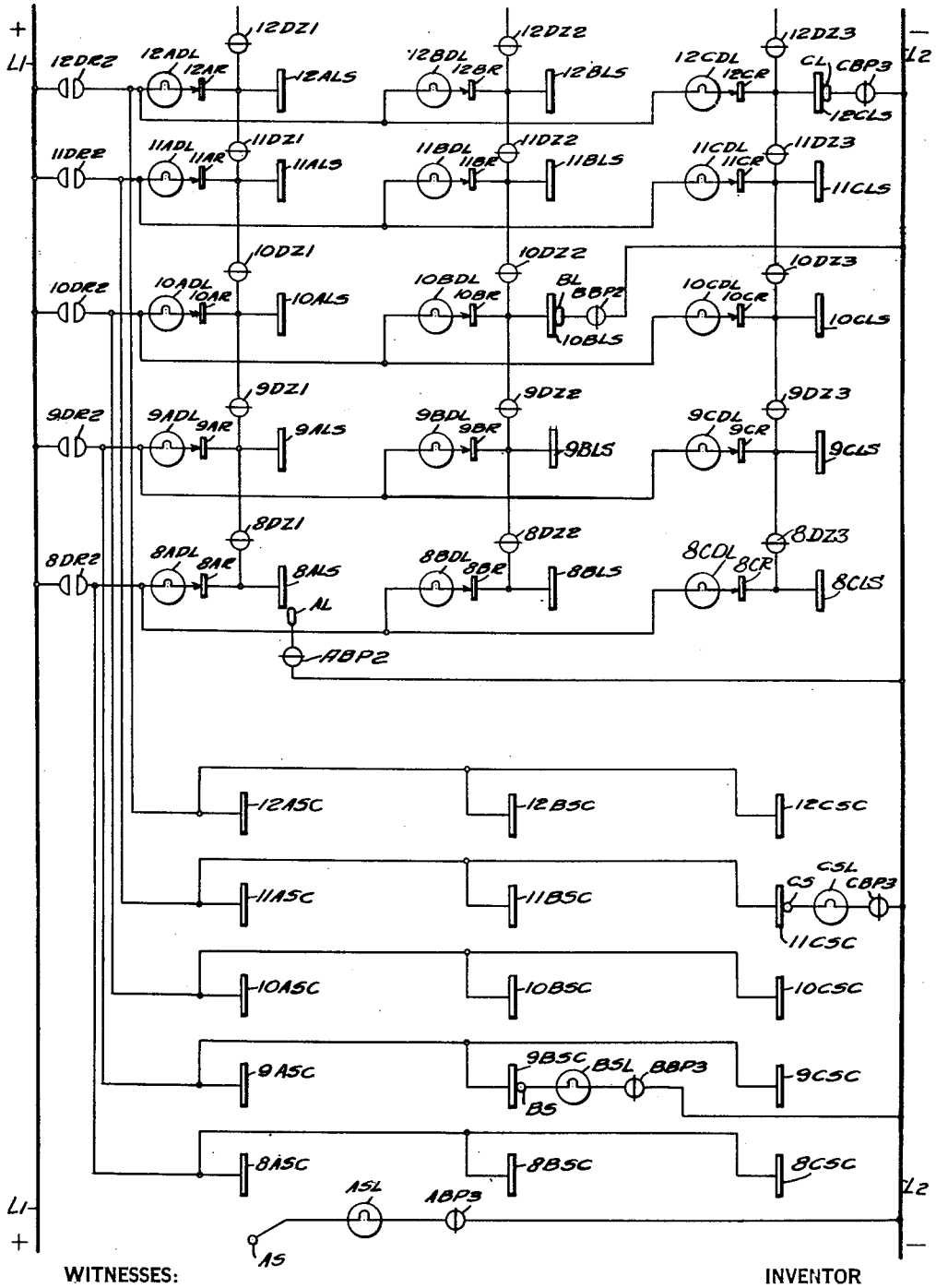
Fig. 4.

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ELEVATOR SIGNALING SYSTEM

Filed July 16, 1935 5 Sheets-Sheet 5



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Fig. 5.

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Patented Nov. 30, 1937

2,100,736

UNITED STATES PATENT OFFICE

2,100,736

ELEVATOR SIGNALING SYSTEM

William F. Eames, Pittsburgh, Pa., assignor to Westinghouse Electric Elevator Company, Chicago, Ill., a corporation of Illinois

Application July 16, 1935, Serial No. 31,617

2 Claims. (Cl. 177—336)

My invention relates generally to electric elevator systems, and it has particular relation to signal systems therefor.

In an elevator system it is desirable to provide a signal, to a person operating a hall call-button, which indicates as soon as the button is depressed the car which will answer the call. When a system of this type is used, the total lapse of time for the travel of an elevator car from one terminal to the other is considerably decreased due to the fact that it is unnecessary for the car to wait at the floor while the person who pressed the button walks over to the elevator door. The instant that the hall call-button is depressed, the floor lantern of the car that is to answer the call is immediately energized regardless of the distance away from the floor that the car may be. The person operating the hall call-button may then wait at the door corresponding to the illuminated lantern and is then ready to immediately step on board the elevator car as soon as it arrives at the floor and its doors are opened.

The object of my invention, generally stated, is to provide an instant signal system for a bank of elevator cars which shall be simple, efficient and accurate in operation and which may be readily and economically manufactured and installed.

An important object of my invention is to provide a signal system for a bank of elevator cars for instantly indicating to a person operating a hall call-button the car which is to answer the call as soon as the call is registered.

Another important object of my invention is to provide a signal system for a bank of elevator cars for preventing the display of more than one signal at a floor where a call has been registered to indicate the car which will answer the call.

A further object of my invention is to provide in an instant signal system for a bank of elevator cars, a hall lantern relay individual to each floor, to each elevator car, and to each direction of travel and operable in response to the registration of a call at a floor for instantly lighting the hall lantern individual to the car that will answer the call and for preventing the operation of more than a single hall lantern relay in response to the call.

Still another object of my invention is to provide a signal system for a bank of elevator cars for preventing the display of signals at floors other than the floor where a call has been registered.

Another object of my invention is to prevent the application of energizing voltage to the signals of a bank of elevator cars at floors other than the floor where a call has been registered.

Still another object of my invention is to provide in an instant signal system for a bank of elevator cars a hall lantern individual to each floor, to each elevator car and to each direction of travel in series circuit relation with a rectifier for preventing the application of energizing voltage to the hall lanterns at floors other than the floor where a call is registered.

Other objects of my invention will in part be obvious and in part appear hereinafter.

My invention is accordingly disclosed in the embodiments hereof illustrated in the accompanying drawings and comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the constructions hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of my invention, reference may be had to the following detailed description, taken in connection with the accompanying drawings, in which:

Figures 1 and 2 illustrate diagrammatically the circuits which may be employed in practicing my invention;

Figs. 3 and 4 correspond respectively to Figs. 1 and 2 of the drawings and illustrate the physical arrangement of the operating windings and the contact members of the relays illustrated in the diagrams shown in Figs. 1 and 2; and

Fig. 5 illustrates circuits corresponding to those shown in Fig. 2, with the hall lantern relays omitted.

According to my invention, I provide a hall call-button at each floor for each direction of travel. A hall lantern is also provided at each floor for each elevator car. In order to stop the elevator car nearest to the floor where a call is registered which is traveling in the direction for which the call is registered, an elevator system operating as set forth in my copending application Serial No. 700,257, filed November 29, 1933, Patent No. 2,066,930 dated January 5, 1937, may be employed. Since any suitable elevator system in which circuits are provided for stopping the elevator car nearest to the floor where a call is registered and traveling in the direction for which the call is registered may be employed, it has been thought unnecessary to further complicate the description and illustration of this invention by showing the details of the control circuits for the elevator cars.

In conjunction with each floor, a zoning relay is provided. The zoning relays are arranged to be operated by means of a floor selector individual to each elevator car. As the elevator cars pass the various floors, the zoning relays individual thereto are energized to isolate the signaling circuits to the remaining cars in the bank so that only the car in the zone may receive signals and transmit signals indicating that it is the car which is to answer a particular call.

As soon as a call is registered at a floor, the hall lantern of the car in the zone including the floor where the call is registered will be lighted, thereby indicating that the elevator car individual to that hall lantern will stop at the floor. In one modification of the invention, a hall lantern relay is immediately energized on the operation of a hall call-button and it, in turn, immediately completes a circuit for lighting the hall lantern individual thereto. The hall lantern relay also opens certain previously closed circuits, thereby preventing the operation of more than a single hall lantern relay at a floor, which operation might take place in the event that there were two elevator cars in the zone including the floor where a call is registered, either of which might answer the call.

If the hall lantern relays are not used, then the hall lanterns may be lighted without their interposition. However, when a system of this type is used, there is the possibility that certain sneak circuits may be present which will cause the application of energizing voltage to hall lanterns at floors other than a floor where a call is registered. False signals may then be given at these floors which might be considered to indicate that an elevator car will stop at these floors although such operation is not intended and will not take place.

I have observed that the energizing current always flows in a reverse direction in the sneak circuits through at least one of the hall lanterns in the circuit which, under desired operating conditions, should not be energized. Ordinarily two or more of the hall lanterns will have applied thereto a reduced voltage since they are connected in the sneak circuits in series circuit relation, and although they will not be illuminated at full brilliancy, still they will be partially illuminated. A particular sneak circuit will be traced hereinafter in order to illustrate this operation.

I have discovered that if a rectifier, such as a copper-oxide rectifier, is placed in series circuit relation with each lantern and so connected that current under normal operating conditions is permitted to flow therethrough, then the resulting faulty operation due to the sneak circuits will be entirely avoided. In order to prevent the application of energizing voltage to the operating windings of the hall lantern relays which may be substituted in the circuits for the hall lanterns, the rectifiers may also be employed. There will, therefore, be no energizing voltage applied to the hall lanterns or the windings of hall lantern relays at other floors, and consequently there will be no false indications in the signal system.

In the drawings only the necessary circuits have been shown for illustrating the connections for floors 8 through 12 and also for the operation of the elevator cars in the down direction. The corresponding floor selector brushes and hall buttons only have been illustrated. The system has been illustrated for use in conjunction with an elevator bank comprising three cars A, B and C. Additional contact members of the high speed relay V of my copending application only are shown herein for effecting certain control functions; the functioning of this relay being fully set forth in my copending application.

Referring now to Figs. 1 and 2 of the drawings, it will be observed that down hall call buttons 8D through 12D have been illustrated. It will be understood that these buttons are located at each floor in a central position where persons desiring to use the elevator cars may have ready access to them. Each of the call buttons has individual thereto, respectively, down call storing relays 8DR through 12DR. These relays are each provided with a main operating winding, having the same reference character as the relay, and a neutralizing winding bearing the same reference character with the addition of the letter N. When the neutralizing windings are energized, the ampere turns of the main operating windings are in effect cancelled or neutralized and the relays are permitted to return to the non-operated position.

At each floor each elevator car is provided with a down hall lantern. Thus, for the first car A, hall lanterns 8ADL through 12ADL are provided, for the second car B, hall lanterns 8BDL through 12BDL are provided, while for the third car C, hall lanterns 8CDL through 12CDL are provided. The hall lanterns are illustrated at the bottom of Fig. 2 of the drawings. For the reasons set forth hereinbefore, elevator cars A, B and C are not shown herein.

Each floor has individual thereto a zoning relay. Thus the floors 8 through 12 are provided, respectively, with down zoning relays 8DZ through 12DZ. The operating windings of these relays are arranged to be connected respectively to the down zoning segments 8AZS through 12AZS of car A, to segments 8BZS through 12BZS of car B, and to segments 8CZS through 12CZS of car C. Each of these sets of zoning segments has individual thereto, respectively, brushes AZ, BZ and CZ which it will be understood are moved in accordance with the movement in the hatchway of the respective elevator cars. It will be observed that the brushes AZ, BZ and CZ are illustrated in elongated form. This representation indicates that they are arranged to engage the next zoning segments before they leave the segments with which they are already in engagement. The zoning relays will then be successively energized, each one being deenergized after the next zoning relay is energized.

In this embodiment of the invention, each of the elevator cars is provided at each floor with a down hall lantern relay. Thus, each elevator car is provided with a down hall lantern relay at floors 8 through 12. For example, car A has at these floors, respectively, hall lantern relays 8AD through 12AD, car B, hall lantern relays 8BD through 12BD and car C, hall lantern relays 8CD through 12CD. Each hall lantern relay has individual thereto a hall lantern segment. Thus, the hall lantern relays individual to car A have corresponding hall lantern segments 8ALS through 12ALS, car B, hall lantern segments 8BLS through 12BLS and car C, hall lantern segments 8CLS through 12CLS. As illustrated, these groups of segments have individual thereto brushes AL, BL and CL which, it will be understood, move in accordance with the corresponding elevator car in its hatchway. The brushes AL, BL and CL are shown in elongated form in order to indicate that the next segments are

engaged before the last segments are left. This arrangement permits the next hall lantern segments to be energized before the preceding hall lantern segments are deenergized. The hall lantern relay at the floor where a call is registered will thus be continuously energized.

In this embodiment of the invention, the hall lantern relays are arranged to complete circuits for energizing the hall lanterns individual thereto. The hall lantern relays individual to cars A and B are also provided with contact members which are arranged to open certain energizing circuits to prevent the operation of more than a single hall lantern relay at a floor for a given direction of travel.

In order to indicate to the operator of the elevator car that a call has been registered in his zone of travel, car stop lights ASL, BSL and CSL individual to each of the three cars are provided. These stop lights are arranged to be energized after a call has been registered through the agency of signal car stop segments 8ASC through 12ASC individual to floors 8 through 12, respectively, to car A and to the car stop light ASL. In like manner, signal car stop segments 8BSC through 12BSC are provided for car B and signal car stop segments 8CSC through 12CSC are provided for car C. Brushes AS, BS and CS individual to these groups of segments also are provided.

In the event that an operator does not wish to stop at a floor, as, for example under conditions when the elevator car is fully loaded, he may bypass the floor by operating a bypass relay. The function of the bypass relay is to permit the registered call to be transferred to the next car so that the floor lantern individual to it at the floor where the call is registered may be illuminated. For this purpose, bypass relays ABP, BBP and CBP are provided individual to each of the cars. These relays may be operated by means of bypass switches A', B' and C', respectively, which are located in the control panel of the corresponding elevator car.

After an elevator car has stopped at a floor, it is desirable to cancel the call which has been registered by energizing the neutralizing winding of the call storing relay which had previously been operated in response to the operation of the hall call button. For this purpose down call canceling segments individual to each floor and to each car are provided. Thus, for car A down call canceling segments 8ACS through 12ACS are provided, for car B, call canceling segments 8BCS through 12BCS and for car C, call canceling segments 8CCS through 12CCS. Brushes AC, BC and CC are provided individual to each of these groups of call canceling segments and it will be understood that they move in accordance with the movement of their respective elevator cars in the hatchway.

In order to prevent the application of energizing voltage to the operating winding of any other floor lantern relay, than the operating winding of the hall lantern relay at the floor where a call is registered, rectifiers, preferably of the copper oxide type, are provided in series circuit relation with each of these operating windings. Thus, the operating windings of the hall lantern relays 8AD through 12AD are connected for energization through rectifiers 8AR through 12AR, respectively. In like manner, the operating windings of the hall lantern relays 8BD through 12BD are connected through rectifiers 8BR through 12BR, and the operating windings of the hall lantern relays 8CD through 12CD are connected through rectifiers 8CR through 12CR. As will be set forth hereinafter, these rectifiers prevent the energization of the operating winding of any hall lantern relay other than the hall lantern relay individual to the floor where a call is registered.

In setting forth the operation of the herein described signaling system, it will be assumed that conductors L1 and L2 have applied thereto a direct current energizing voltage of the polarity indicated. It will further be assumed that the three elevator cars A, B and C, with which the system is associated, are moving in the down direction and, therefore, under these conditions the high speed relays V are energized. Under these operating conditions contact members AV, BV and CV of the three elevator cars A, B and C, respectively, are not bridged.

It will be assumed that a person at the ninth floor desires to travel in the down direction. Therefore, he operates the hall call button 9D. A circuit is then completed for energizing the main operating winding of the down call storing relay 9DR. This circuit may be traced as follows: L1, 9D, 9DR, L2. At contact members 9DR1 an obvious holding circuit is completed for maintaining the operating winding 9DR in the energized condition.

At this time, as illustrated by the positions of the brushes in conjunction with the various segments of the floor selectors, it will be observed that car A is assumed to be at the eighth floor, car B at the tenth floor and car C at the twelfth floor. As a result of this arrangement of the elevator cars, the zoning relay 8DZ is energized over a circuit which may be traced as follows: L1, 8DZ, 8AZS, AZ, ABP1, L2. As a result of the energization of the down zoning relay 8DZ, contact members 8DZ1, 8DZ2 and 8DZ3 are opened, thereby opening the signaling circuits in the downward direction. The down zoning relay 12DZ also is energized over a circuit: L1, 12DZ, 12CZS, CZ, CBP1. L2. As a result, contact members 12DZ1, 12DZ2 and 12DZ3 are opened, thereby opening the signaling circuits in the up direction. Also the down zoning relay 10DZ is energized over a circuit: L1, 10DZ, 10BZS, BZ, BBP1, L2. The energization of the down zoning relay 10DZ opens contact members 10DZ1, 10DZ2 and 10DZ3, thereby preventing the call which has been registered on the call storing relay 9DR from normally effecting the energization of any other hall lantern relay than the hall lantern relay 9BD associated with car B.

A further result of the energization of the call storing relay 9DR is to complete a circuit for energizing the operating winding of the down hall lantern relay 9BD: L1. 9DR2. 9AD1, 9BD, 9BR, 9DZ2, 10BLS, BL, BBP2, L2. No other hall lantern relay should at this time be energized because of the operation of the zoning relays which should permit the operation only of the hall lantern relay 9BD which is individual to the ninth floor and to car B.

As a result of the energization of the hall lantern relay 9BD, a circuit is completed for energizing the down hall lantern 9BDL: L1, 9BD2, 9BDL, L2. The down hall lantern individual to car B at the ninth floor is now energized and the person at this floor is informed that car B will stop in response to the call. He can then immediately place himself at the entrance to this elevator car so that he may enter it as soon as it arrives at the floor.

A further result of the operation of the down hall lantern relay 9BD is to open contact members 9BD1. Thus, if car C had been at the same position in which car B was at the time that the call was registered, its down hall lantern relay 9CD would not have been energized. It will then be apparent that this system prevents the operation of more than a single hall lantern relay at a floor even though there may be two elevator cars which, under certain conditions, would be in position to answer the call.

As car B continues to approach the ninth floor, the energizing circuit for the down hall lantern relay 9BD is transferred from hall lantern segment 10BLS to 9BLS and in addition due to the downward movement of car B, the previously traced energizing circuit for the down zoning relay 10DZ is opened and a similar energizing circuit for the down zoning relay 9DZ is completed.

The operator is informed that the elevator car B will be stopped at the ninth floor by the illumination of the car stop light BSL. The circuit for energizing this light may be traced as follows: L1, 9DR2, 9BSC, BS, BSL, BBP3, L2. In the event that the operator does not wish to answer the call at the ninth floor, for the reason that car B is fully loaded or for any other reason, he may operate the bypass switch B' and as a result an obvious energizing circuit is completed for the operating winding of the bypass relay BBP.

The operation of the bypass relay BBP opens contact members BBP1 which prevents the energization of any of the zoning relays in accordance with the movement of car B. As a result, the call will be assigned to car C and the hall lantern relay 9CD will be energized; L1, 9DR2, 9AD1, 9BD1, 9CD, 9CR, 9DZ3, 10DZ3, 11DZ3, 12CLS, CL, CBP3, L2. The energizing circuit for the operating winding of the hall lantern relay 9CD will be transferred from hall lantern segment to hall lantern segment until the segment 9CLS is reached by the brush CL. The operation of the hall lantern relay 9CD also completes a circuit for energizing the hall lantern 9CDL: L1, 9CD1, 9CDL, L2.

A further result of the energization of the bypass relay BBP is to open at contact members BBP2 the circuit to the brush BL, thereby preventing the energization of any of the down hall lantern relays individual to car B. A still further result is to open contact members BBP3 which serves to extinguish the car stop light BSL.

It will be assumed, however, that the operator does not depress the bypass switch B' and as a result car B stops at the ninth floor. In order to stop at this floor, the contact members BV of the speed relay for car B are bridged and as a result the neutralizing winding 9DRN is energized: L1, 9DR1, 9DRN, 9BCS, BC, BV, L2. The call storing relay 9DR is then restored to the non-operated condition. As a result of the restoration of the call storing relay 9DR to the non-operated position, the previously traced energizing circuit for the down hall lantern relay 9BD is opened, it is deenergized and the down hall lantern 9BDL is extinguished.

Referring now particularly to Fig. 5 of the drawings, it will be observed that the down hall lantern relays illustrated in Fig. 2 have been replaced by the down hall lanterns which are individual thereto. There is then present the possibility that more than a single hall lantern may be illuminated at a floor in response to the registration of a call at a floor since no provision is made as is provided by, for example, the contact members 9BD1 of the down hall lantern relay 9BD in preventing the energization of the hall lantern relay 9CD. However, this particular condition may not often arise, and, therefore, under certain conditions it may be desirable to dispense with the hall lantern relays and connect in lieu of the operating windings thereof the hall lanterns.

Since the circuits illustrated in Fig. 5 are otherwise identical with those illustrated in Fig. 2 of the drawings, it has not been necessary to duplicate the showing of the relation of the various contact members and operating windings.

In describing the functioning of the system illustrated in Fig. 5, it will be again assumed that a call has been registered at the ninth floor. As a result, a circuit is completed for energizing the down hall lantern 9BDL: L1, 9DR2, 9BDL, 9BR, 9DZ2, 10BLS, BL, BBP2, L2.

In the event that the rectifiers are not connected, as illustrated, a sneak circuit will also be completed at this time which may be traced as follows, neglecting the rectifiers: L1, 9DR2, 9ADL, 9DZ1, 10ADL, 10BDL, 10BLS, BL, BBP2, L2. As a result, a reduced voltage will be applied to each of the hall lanterns 9ADL, 10ADL and 10BDL, they will be correspondingly illuminated and false signals will be given at the ninth and the tenth floors. It will be observed, however, that the current flows through the hall lantern 10ADL in a reverse direction from that in which it normally flows when it is intended that the down hall lantern 10ADL should be illuminated. In like manner, it will be found that in every instance where there is a sneak circuit which would cause the display of a false signal, the current must flow through it, in part, in a reverse direction. Therefore, in the particular sneak circuit traced, the rectifier 10AR effectively prevents the flow of current therethrough and, as a result, only the hall lantern 9BDL is illuminated.

The remaining functioning of the system illustrated in Fig. 5 of the drawings will be identical with that described in connection with the system illustrated in Fig. 2, other than has been pointed out hereinbefore, and, therefore, the remaining steps will not be repeated.

It is pointed out that the rectifiers are employed in the circuits shown in Fig. 2 of the drawings in connection with the hall lantern relays for the purpose of avoiding the application of potential to the operating windings of these relays which it is not intended should be energized. It will be obvious, however, that, when relays are employed, they may be so adjusted that they will not be energized on the reduced voltage which would be available in the sneak circuits. As a result, the rectifiers may be dispensed with if proper relay construction and adjustment are employed. However, if the circuits illustrated in Fig. 5 are employed, the application of voltage in the sneak circuits will cause a partial illumination of the hall lanterns not intended to be lighted. As a result, it is necessary to employ some means such as the rectifiers for effectively preventing the flow of any current through the sneak circuits.

Since certain further changes may be made in the foregoing constructions and different embodiments of the invention may be made without departing from the scope thereof, it is intended

that all matter shown in the accompanying drawings or set forth in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In an elevator system in which a plurality of elevator cars are operable past a plurality of floors, in combination, a call button individual to each floor, a call storing relay individual to each call button and disposed to be energized on operation thereof, a hall lantern at each floor individual to each elevator car, a hall lantern relay individual to each hall lantern, energizing circuits for the lantern relays, means responsive to operation of a call button and the position of the cars for operating the hall lantern relay individual to the floor of the operated button and to the elevator car disposed to answer the call, and means responsive to said operated lantern relay for operating the corresponding hall lantern for indicating the car to stop in answer to the operated button, and interlocking contact members in the lantern relay circuits responsive to operation of said lantern relays for preventing the energization of more than one floor lantern relay at any one time to prevent the lighting of more than one floor lantern at any one time in answer to said operated button.

2. In an elevator system in which a plurality of elevator cars are operable past a plurality of floors, in combination, a call button individual to each floor, a call storing relay individual to each call button and disposed to be energized on operation thereof, a hall lantern at each floor individual to each elevator car, a hall lantern relay individual to each hall lantern, energizing circuits for said lantern relays, zoning means for effecting the immediate operation of the hall lantern relay individual to a floor where a call is registered and to the elevator car disposed to answer the call, means responsive to said operated lantern relay for effecting the lighting of the corresponding hall lantern for indicating the car to stop in answer to the call registered, and interlocking contact members in the lantern relay circuits responsive to operation of the lantern relays for preventing the energization of more than one floor lantern relay to prevent the lighting of more than one floor lantern when a plurality of cars are equi-distant from the floor of the registered call.

WILLIAM F. EAMES.