

2,903,093

Filed Oct. 1, 1958

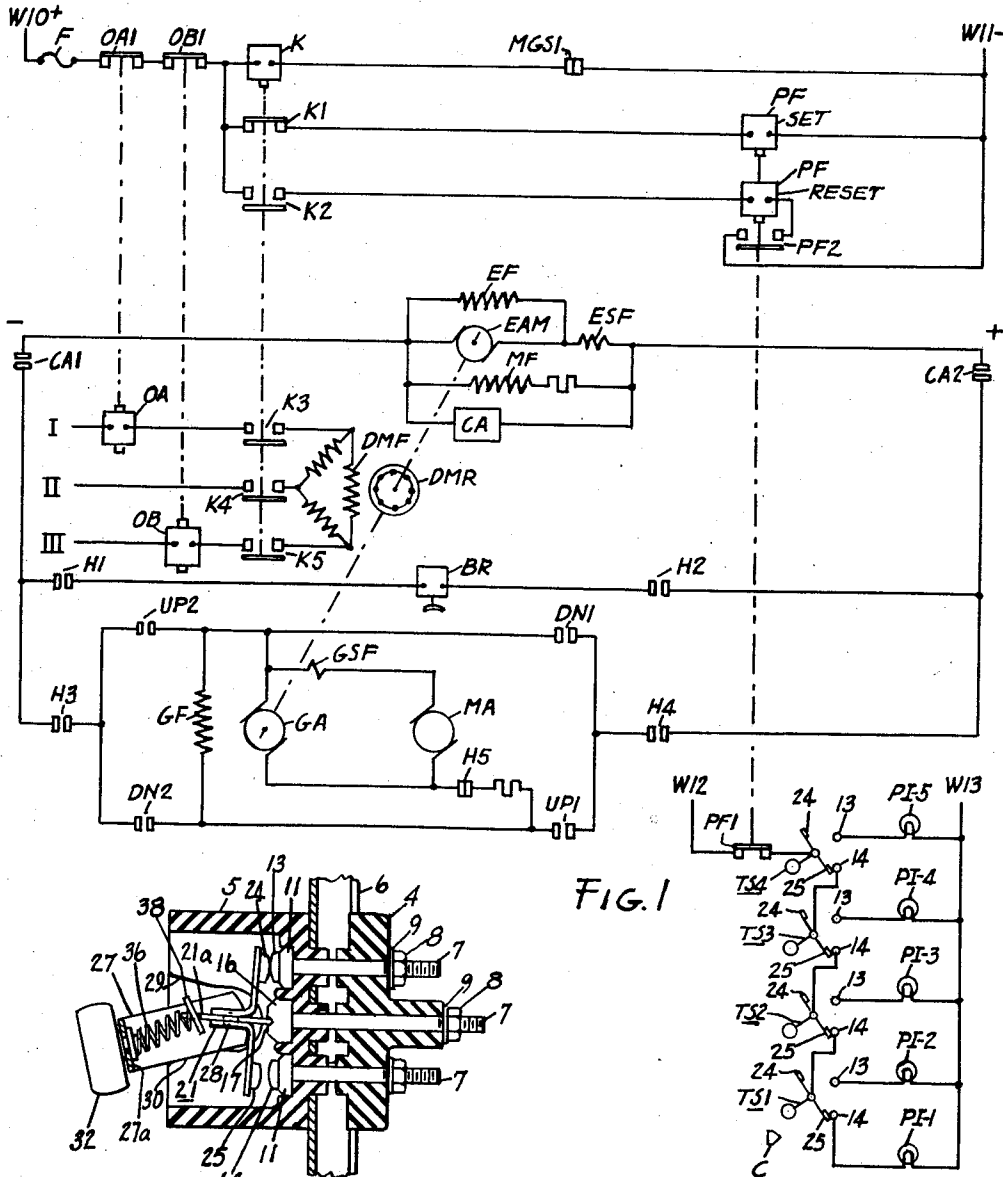


FIG. 1

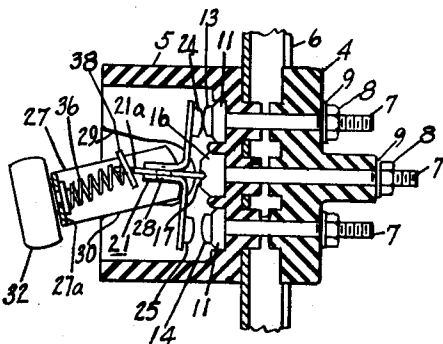


FIG. 3

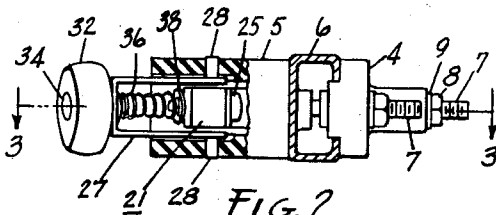


FIG. 2

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CONTROL OF POSITION INDICATOR FOR ELEVATORS

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Application October 1, 1958, Serial No. 764,671

6 Claims. (Cl. 187—29)

The invention relates to position indicating mechanism for elevators and especially to control mechanism therefor.

In elevator installations it is usual to provide a device to indicate which elevator cars are in service and the position of the various cars in their respective hoistways. Also, it is usual to indicate this information visually on one or more strategically placed panels by means of sequentially actuated electric light sources positioned in a row for each car, each light source in the row corresponding to a floor served by the car. Such a panel is usually located at the main lobby, where it is accessible to the "starter," who supervises the operation of the elevators. A duplicate panel is occasionally located in the maintenance center of the building, where it is accessible to maintenance personnel.

It is desirable that this device remains operative in the event that an elevator car stops operating due to an abnormal stopping of its hoisting mechanism, such as a power failure caused by an overload, so that the "starter" and maintenance personnel may locate the position of the car thus stranded in the hoistway. This is especially true in modern day elevator installations, where elevators without attendants operate as a group according to predetermined operating programs.

In such installations automatic mechanism is provided to change the elevator operation from one program to another as the elevator traffic varies throughout the day and in so doing, one or more elevators may repeatedly be taken out of service and later put back in service in accordance with the operation desired. When an elevator is thus taken out of service and parked at a floor by the automatic mechanism, the position indicator light sources are extinguished to denote its non-operating condition. However, the supervisory personnel cannot easily determine whether the car had been properly taken out of service by the automatic mechanism, since should an abnormal elevator stopping occur, the position indicator light sources would also be extinguished. Furthermore, in such a case they cannot readily determine where in the hoistway the stranded car is located.

It is therefore an object of this invention to provide a device which will maintain the electric car position indicator device operative when the elevator hoisting mechanism is stopped abnormally.

It is another object of this invention to provide a device which will extinguish the indicating light sources of an electric visual car position indicator when a car is removed from service in a normal manner, but which will maintain that light source lit to indicate the position of the car when the car becomes non-operative due to a power failure of its hoisting mechanism.

Features and advantages of the invention will be apparent from the above and from the following description of operation when considered in conjunction with the drawings in which:

Figure 1 is a simplified schematic wiring diagram of a portion of the elevator hoisting mechanism power and

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control circuits and of the position indicating device circuits embodying the invention;

Figure 2 is a side elevation of a form of toggle switch used in the position indicating device circuits of Figure 1, with portions broken away to show certain details of the interior thereof; and

Figure 3 is a cross-sectional view of the same toggle switch taken approximately along the line 3—3 of Figure 2.

Referring to Figure 1, the elevator car hoisting mechanism is shown as consisting of a direct current hoisting motor having an armature MA which is supplied with current at a variable voltage from a generator armature GA which is rotated by a driving motor having a rotor DMR. The polyphase field winding DMF of the driving motor is delta connected and is supplied with three phase alternating power from any suitable source (not shown) over supply lines I, II and III. Coils designated OA and OB of corresponding overload relays are connected in supply lines I and III, respectively. These relays are pre-adjusted to operate when the currents passing through their respective coils exceed a predetermined value for a predetermined time, deemed an overload.

An exciter driven by the driving motor and consisting of an armature EAM, a self-excited field winding EF and a series field winding ESF supplies current to the separately excited generator field winding GF, hoistway machine field winding MF, the coil CA of the electromagnetic potential switch and brake release coil BR. The generator has a series field winding GSF.

Supply lines W10+ and W11— apply unidirectional power to coil K of the driving motor stopping switch and to the set of and reset coils PF of the position indicator control switch. A circuit breaker or fuse designated F is connected in supply line W10+.

For simplicity, the activating coils of the following electromagnetic switches have not been shown, they being operated in the usual fashion and only their contacts, as shown in the circuit of Figure 1, being involved in the operation of the subject invention. These switches and their actuating mechanisms are described in detail in Patent No. 2,761,528 to W. F. Glaser et al. issued September 4, 1956 in which system the subject invention may be utilized:

DN—Down direction switch
H—Field and brake switch
MGS—Motor generator stopping switch
UP—Up direction switch

Up direction switch (UP) and down direction switch (DN) are moved to and latched in their operated conditions incident to the car becoming preset for travel in the up and the down directions, respectively. Conversely, these switches are moved to their unoperated conditions when the car is preset for travel in the opposite directions. Field and brake switch (H) is energized incident to the car being moved away from a floor landing and is de-energized when the car stops at a floor landing. Motor generator stopping switch (MGS) is responsive to automatic and manual controls which are actuated incident to changing the mode of operation of the elevator system as required.

Electromagnetic relay and switch contacts are designated by letters corresponding to their activating coils, number suffixes being added to distinguished between sets of contacts on the same coil or switch and are shown for the unenergized condition of their coils. Position indicator control switch (PF) is shown in its reset condition.

Alternating power from any suitable source (not shown) is supplied over lines W12 and W13 to the position indicator lamp circuit of Figure 1, wherein the position indicator lamps are designated PI-1 through PI-5,

the number suffixes of each lamp corresponding to the floor landing for which that lamp is provided. This position indicator lamp circuit is the subject matter of the copending application of A. E. Prince, No. 768,368, filed October 20, 1958. Position indicator lamps PI-1-5 may be mounted in a starter's panel similar to the one disclosed in Figure 17 of Patent No. 2,589,242 to Glaser et al., issued March 18, 1952. Single pole, double throw toggle switches TS1-4 having stationary contacts 13, 14 and movable contacts 24, 25 are of the snap action latching type and are sequentially actuated in accordance with movement of the elevator car. These switches may be mounted in the hoistway at each floor landing to be actuated by a cam C carried by the car or may be mounted on the floor bars of a selector, such as disclosed in Figure 2 of the aforementioned Glaser Patent No. 2,589,242, to be actuated by a cam C carried by the crosshead of the selector.

The construction of toggle switches TS1-4 is more fully shown in Figures 2 and 3. The various parts are shown mounted on a switch housing consisting of two insulating members 4 and 5 which in turn are mounted on a selector floor bar 6 by means of three studs 7. These studs pass through apertures in floor bar 6 (but do not touch it) and housing members 4 and 5 and are secured in place by nuts 8 and lock washers 9. The threaded end portion of studs 7 are made long enough to serve as terminals for connecting the various electrical leads illustrated in the position indicator lamp circuit of Figure 1. The heads 11 of two of the studs 7 have formed thereon stationary contacts 13 and 14, respectively, of silver material. Defined in the head 16 of the third stud 7 is a groove 17 which forms a pivot for metallic switch lever 21, having a substantially cross shape with one end of its vertically extending member 21a pivotally positioned in groove 17. Its horizontally extending member has affixed at one end a contact 24 which engages with stationary contact 13 when switch lever 21 is in one extreme position, and at its other end a contact 25 which engages with stationary contact 14 when switch lever 21 is in the other extreme position. A substantially U-shaped toggle link 27 having a web portion 27a is pivotally secured to housing member 5 by means of two pins 28. Shoulders 29 and 30 formed in housing member 5 act as stops to limit the movement of toggle link 27. A roller 32 of insulating material is rotatably secured to toggle link 27 by means of stud 34 the end of which protrudes through web portion 27a. A coil spring 36 under compression has one end positioned around the protruding end of stud 34 and presses at that end against web portion 27a and at the other end against oversize washer 38 which in turn rests on shoulders formed on the adjacent end of vertically extending member 21a of switch lever 21.

In the manner characteristic of such switches, the movement of toggle link 27 to a position slightly past its mid position results in a snap action of switch lever 21 to open the contacts at one of its ends and close those at its opposite end substantially instantaneously. Spring 36 provides, in either position, sufficient tension to hold the contacting members securely together.

The operation of the arrangement can be visualized with reference to Figure 1, if it is assumed that the motor generator set is not running and the car is parked at the first floor landing. Further assume that its up direction switch (UP) (not shown) is latched in its operated condition with its contacts UP1 and UP2 engaged to preset the car for upward travel. In such a case motor generator stopping switch (MGS) (not shown) is in its energized condition maintaining its contacts MGS1 separated, and the set coil PF of the position indicator control switch is energized through driving motor stopping switch contacts K1. With the position indicator control switch (PF) in its set condition, contacts PF2 are closed and contacts PF1 are

separated to maintain position indicator lamps PI-1-5 extinguished.

Next assume that motor generator stopping switch (MGS) (not shown) is deenergized to start the motor generator set running and that it closes its contacts MGS1 to complete a circuit for the coil K of the driving motor stopping switch. Contacts K3, K4 and K5 engage to complete the circuit for polyphase field winding DMF to start the driving motor. Rotation of the motor causes the exciter voltage to build up to full value and energize separately excited hoisting motor field MF and the coil CA of the potential switch. Potential switch contacts CA1 and CA2 engage without effect at this time.

The driving motor stopping switch also separates its contacts K1 deenergizing the set coil PF of the position indicator control switch and engages its contacts K2 energizing the reset coil PF of the position indicator control switch, the latter circuit extending through W10+, F, OA1, OB1, K2, the reset coil PF, PF2 and W11-. The position indicator control switch moves to its reset position separating contacts PF2 and engaging contacts PF1 to complete a circuit for position indicator lamp PI-1, the circuit extending through W12, PF1, toggle switches TS4-TS1, PI-1 and W13.

Incident to the car leaving the floor, field and brake switch (H) (not shown) is actuated engaging contacts H1 and H2 to complete the circuit for brake release coil BR, contacts H3 and H4 to complete the circuit through contacts UP1 and UP2 for the generator field winding GF and separating contacts H5 to disconnect generator field winding GF from across generator armature GA. The completion of the circuit for the generator separately excited field winding GF causes current to be supplied from generator armature GA to hoisting motor armature MA causing the elevator hoisting motor to start the car in the up direction.

As the car moves upward, toggle switch TS1 is actuated in accordance with car movement by cam C separating contacts 25 and 14 of toggle switch TS1 to extinguish position indicator lamp PI-1 and engage immediately contacts 24 and 13 of switch TS1 to light lamp PI-2 to indicate the position of the car at the second floor landing.

As the car continues moving upward, toggle switches TS2 to TS4 are actuated in sequence to indicate the position of the car at the third, fourth and fifth floor landings, respectively. The actuation of switch lever 21 (Figure 3) of each toggle switch TS1-4 is so rapid that a substantially continuous indication of the position of the car is obtained.

As the car arrives at the upper floor landing, field and brake switch (H) (not shown) is deenergized, separating contacts H1 and H2 to deenergize brake release coil BR and apply the brake, contacts H3 and H4 to disconnect the generator separately excited field winding GF from the exciter to bring the car to a stop at the upper floor landing and engaging contacts H5 reconnecting generator field winding GF across generator armature GA substantially to destroy the residual flux of the generator field.

Incident to the car stopping at the upper floor landing, up direction switch (UP) (not shown) is deenergized separating its contacts UP1 and UP2, and down direction switch (DN) (not shown) is energized and latched into operated condition engaging contacts DN1 and DN2 presetting the car for travel in the down direction.

Preparatory to starting down, switch (H) is energized, engaging contacts H1 and H2 to complete a circuit for brake release coil BR. Switch (H) also engages contacts H3 and H4 and separates contacts H5 energizing the generator field GF through contacts DN1 and DN2 to supply current to hoisting motor armature MA to move the car in the down direction. As the car moves downward, cam C actuates switch TS4 separating its

contacts 24 and 13 to extinguish lamp PI-5 and engaging its contacts 25 and 14 to light lamp PI-4, the latter circuit extending through W12, PF1, contacts 25 and 14 of switch TS4, contacts 24 and 13 of switch TS3, PI-4 and W13. As the car proceeds downward, toggle switches TS1—TS3 are actuated in reverse sequence to indicate continuously the position of the car.

As the car arrives at the first floor landing, it is brought to a stop in a manner similar to that described in regard to stopping at the upper floor landing, down direction switch (DN) being deenergized and up direction switch (UP) being energized and latched into operated condition to preset the car for travel in the up direction.

Now assume that because of light traffic conditions in the building the car is to be taken out of service and its motor generator set stopped in the normal manner either through manual controls or in response to the aforementioned automatic program controls. To accomplish this motor generator set stopping switch (MGS) (not shown) is energized in response to the manual or automatic controls, thereby separating its contacts MGS1 breaking the circuit for the coil of driving motor stopping switch (K) which releases. Switch (K) separates contacts K3, K4 and K5 interrupting the power supplied to polyphase field winding DMF of the driving motor which stops running.

Switch (K) also separates contacts K2 in the circuit of reset coil PF of the position indicator control switch and engages contacts K1 in the circuit of set coil PF of that switch which is thus actuated to its set position. The position indicator control switch engages contacts PF2 in its reset coil circuit without effect at this time, since contacts K2 are already opened. This switch also separates its contacts PF1 extinguishing position indicator lamp PI-1 to signify that the car has been taken out of operation and its motor generator set has been stopped.

Next assume that while the car is traveling upward and approximately at the third floor landing (at which position position indicator lamp PI-3 is lit) the motor generator set is stopped abnormally due to a power failure of the motor control circuits (circuit breaker or fuse F is operated or excessive load on the driving motor causes overload relays OA and/or OB to be actuated). In such a case the power supply to coil K of the driving motor stopping switch and the set and reset coils PF of the position indicator control switch is interrupted. The driving motor stopping switch (K) releases separating its contacts K3, K4 and K5 to interrupt the power supply to field winding DMF of the driving motor bringing that motor to a stop. As the driving motor comes to a stop, the exciter voltage decreases deenergizing coil CA of the potential switch which separates its contacts CA1 and CA2 interrupting the current flowing to brake release coil BR and generator field winding GF to apply the brake and stop the car. Incident to the car stopping, field and brake switch (H) (not shown) deenergizes separating contacts H3 and H4 and engaging contacts H5 reconnecting generator field winding GF across generator armature GA.

The driving motor stopping switch (K) also engages contacts K1 in the set coil PF circuit of the position indicator control switch without effect since either circuit breaker or fuse F, contacts OA1 and/or contacts OB1 of the overload relays have been actuated, as has been previously stated, and have interrupted the circuit of this coil. Therefore the position indicator control switch (PF) remains in its reset position and its contacts PF1 remain closed maintaining the position indicator lamp PI-3 illuminated to indicate the position of the stranded car. The driving motor stopping switch (K) also separates its contacts K2 without effect.

It will be noted that when the motor generator set is stopped normally, the position indicator lamp is extinguished indicating that the car has been taken out of operation in a normal manner; but when the motor

generator set is stopped due to an overload, the position indicator lamp remains illuminated indicating to supervisory personnel that an abnormal motor generator set stopping has occurred and indicating the position of the stranded car in the hoistway.

When the trouble is remedied and power is again supplied to the driving motor control and position indicator control circuits, the set coil PF of the position indicator control switch is energized through contacts K1 and operates to its set condition separating contacts PF1, thereby momentarily extinguishing position indicator lamp PI-3. This switch (PF) also closes contacts PF2. The driving motor stopping switch (K) is also again energized and separates contacts K1 breaking the circuit to the set coil PF of the position indicator control switch and engages contacts K2 completing a circuit through contacts PF2 for the reset coil PF of this switch. Switch (PF) operates to its reset position separating contacts PF2 and reclosing contacts PF1 to illuminate again position indicator lamp PI-3. Switch (K) also engages contacts K3, K4 and K5 supplying power to driving motor field winding DMF to restart the motor generator set and in turn the hoisting machine, as has been previously described, thereby causing the car to continue its upward travel.

As changes can be made in the above described construction and many apparently different embodiments of this invention can be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown on the accompanying drawings be interpreted as illustrative only and not in a limiting sense.

What is claimed is:

1. In an elevator installation in which an elevator car travels in a hoistway and serves several floor landings of a building and in which there are provided an elevator hoisting machine adapted for propelling said car in said hoistway, a motor generator set adapted for energizing said hoisting machine, means for controlling the operation of said motor generator set, including motor starting and stopping mechanism, overload mechanism operatively responsive to an overload of said motor generator set for actuating said motor stopping mechanism to stop said motor when an overload occurs, and car position indicating means including a plurality of light sources, one each of which corresponds to a floor landing served by said car, said position indicating means being adapted for indicating the position of said car in said hoistway by selectively energizing said light sources in accordance with movement of said car in said hoistway, characterized in that control mechanism responsive to actuation of said motor generator set control is provided for maintaining said position indicating means operative when said motor stopping mechanism is actuated by said overload mechanism.

2. A car position indicator control adapted for use in an elevator installation in which an elevator hoisting machine adapted for propelling an elevator car in a hoistway, a motor generator set adapted for energizing said hoisting machine, and car position indicating means including a plurality of position-indicating electric lamps adapted for indicating the position of said car in said hoistway are provided; said position indicator control comprising, normal motor generator set control means adapted for starting and stopping said motor generator set and in turn said hoisting machine, emergency control means for stopping said motor generator set when abnormal operation of said motor generator set occurs, and electric switch means operatively responsive to said normal motor control means for extinguishing said position indicating lamps only when said motor generator set is stopped by said normal motor control means.

3. A car position indicator control adapted for use in an elevator installation in which an elevator hoisting machine adapted for propelling an elevator car in a

hoistway, first control means adapted for controlling the operation of said elevator car, a motor generator set adapted for energizing said hoisting machine, and car position indicating means including a plurality of electric position indicating lamps adapted for indicating the position of said car in said hoistway are provided; said position indicator control comprising, start and stop means for starting and stopping said motor generator set, second control means operatively responsive to operation of said first control means, for actuating said start and stop means, overload mechanism operatively responsive to an overload of said motor generator set, said overload mechanism actuating said start and stop means to stop said motor generator set when an overload occurs, and electric switch means operatively responsive to said second control means and adapted for extinguishing said position indicating lamps only upon actuation of said start and stop means to stop said motor generator set by said second control means.

4. A car position indicator control adapted for use in an elevator installation in which an elevator hoisting machine for propelling an elevator car in a hoistway, a motor generator set for energizing said hoisting machine, and car position indicating means including a plurality of electric position indicating lamps adapted for indicating the position of said car in said hoistway are provided; said position indicator control comprising, start and stop means for starting and stopping said motor generator set, control means operable to actuate said stop and start means, safety mechanism including overload devices operatively responsive to an overload of said motor generator set to actuate said start and stop means to stop said motor generator set when an overload occurs, and electric switch means selectively responsive to actuation of said start and stop means to extinguish said position indicating lamps only upon operation of said start and stop means by said control means, thereby maintaining said lamps illuminated when said motor generator set is stopped by operation of said safety mechanism.

5. In an elevator installation in which an elevator car travels in a hoistway and serves several floor landings of a building and in which there are provided an elevator hoisting machine adapted for propelling said car in said hoistway, a motor generator set for energizing said hoisting machine, and car position indicating means, said means including a plurality of electric indicating lamps, one each of which corresponds to a floor landing served by said car, said position indicating means being adapted to indicate visually the position of said car in said hoistway by selectively energizing said indicating lamps in accordance with movement of said car in said hoistway; a car position indicator control comprising, first control means for starting and stopping said motor generator set, said first control means being operable from a first condition to a second condition to start said motor generator set running and from said second condition to said first condition to stop said motor

generator set from running, second control means operatively responsive to demand for elevator service for actuating said first control means from said first condition to said second condition for putting said elevator car in service and from said second condition to said first condition for taking said elevator car out of service, motor generator set overload mechanism operatively responsive to an overload of said motor generator set, said overload mechanism being operative to actuate said first control means from said second condition to said first condition when an overload occurs to stop said motor generator set from running, and third control means for lighting and extinguishing said indicating lamps, said third control means being operatively responsive only to actuation of said first control means by said second control means.

6. In an elevator installation in which an elevator car travels in a hoistway and serves several floor landings of a building and in which there are provided an elevator hoisting machine adapted for propelling said car in said hoistway, a motor generator set for energizing said hoisting machine, and car position indicating means, said means including a plurality of electric indicating lamps, one each of which corresponds to a floor landing served by said car, said position indicating means being adapted to indicate visually the position of said car in said hoistway by selectively energizing said indicating lamps in accordance with movement of said car in said hoistway; a car position indicator control comprising, first control means for starting and stopping said motor generator set, said first control means being operative from a first condition to a second condition to start said motor generator set running and from said second condition to said first condition to stop said motor generator set from running, second control means operatively responsive to demand for elevator service for actuating said first control means from said first condition to said second condition for putting said elevator car in service and from said second condition to said first condition for taking said elevator car out of service, motor generator set overload mechanism operatively responsive to an overload of said motor generator set, said overload mechanism being operative to actuate said first control means from said second condition to said first condition when an overload occurs to stop said motor generator set from running, and third control means for extinguishing said indicating lamps when said motor generator set is taken out of operation by actuation of said first control means from said second condition to said first condition by said second control means, and for maintaining said indicating lamps illuminated when said first control means is actuated from said first condition to said second condition by said overload mechanism, said third control means being operatively responsive to actuation of said first control means from said second condition to said first condition only by said second control means.

No references cited.