March 8, 1932. F. E. LEWIS 1,848,366

SIGNALING SYSTEM FOR ELEVATORS

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Fig. 1.

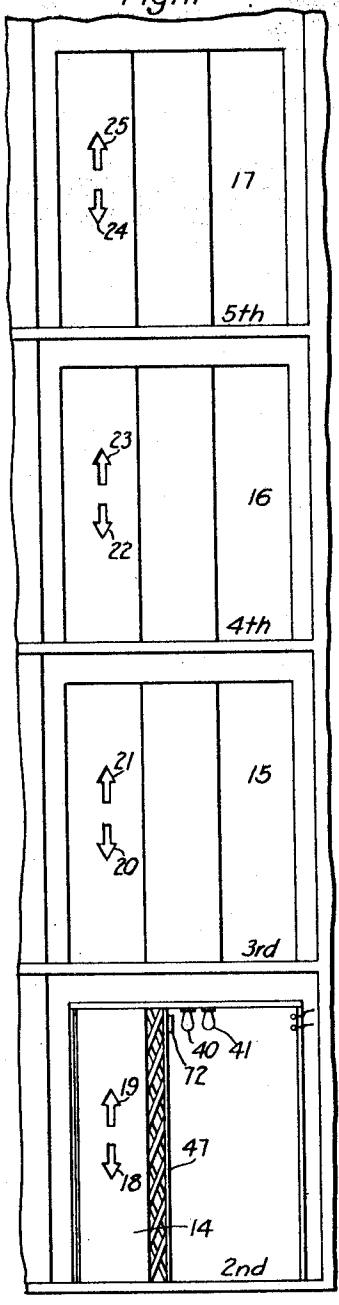


Fig. 2.

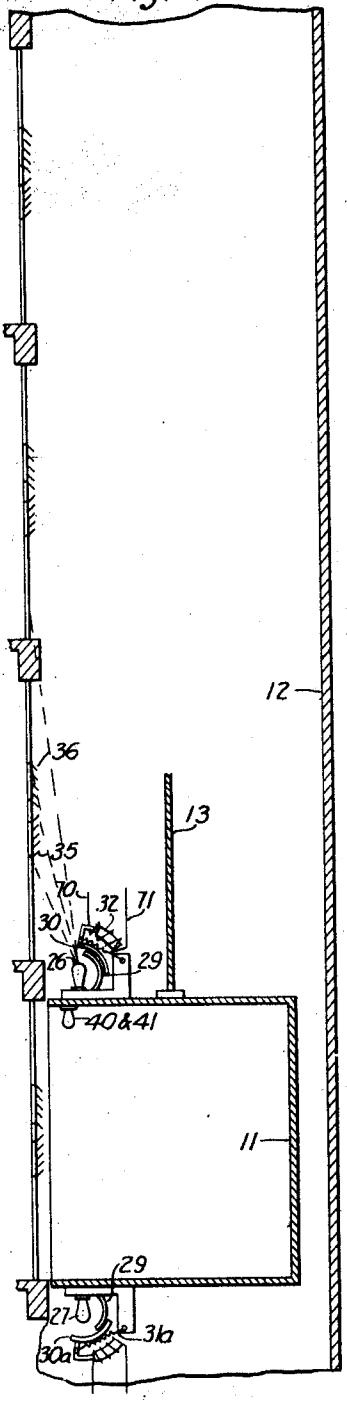
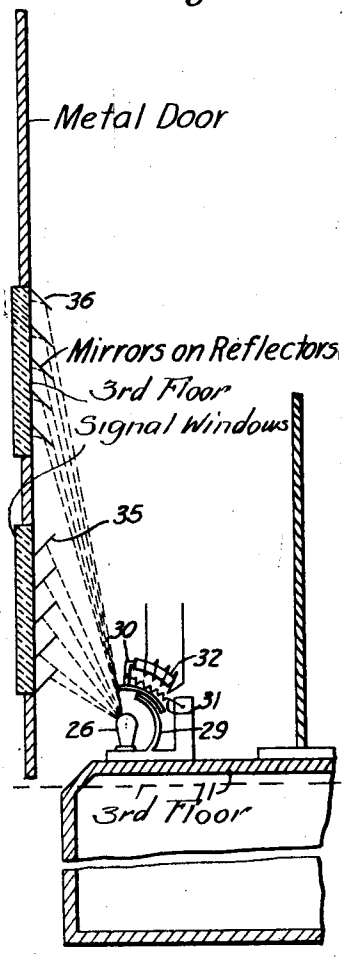


Fig. 3.



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Fig. 4

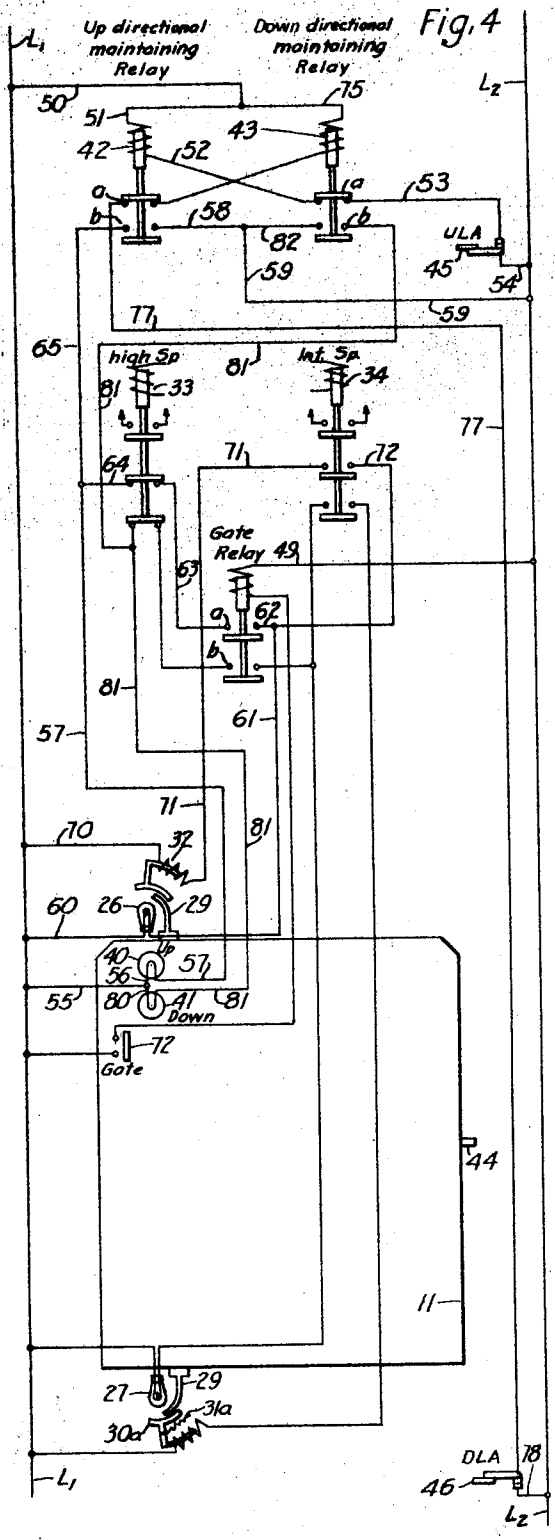
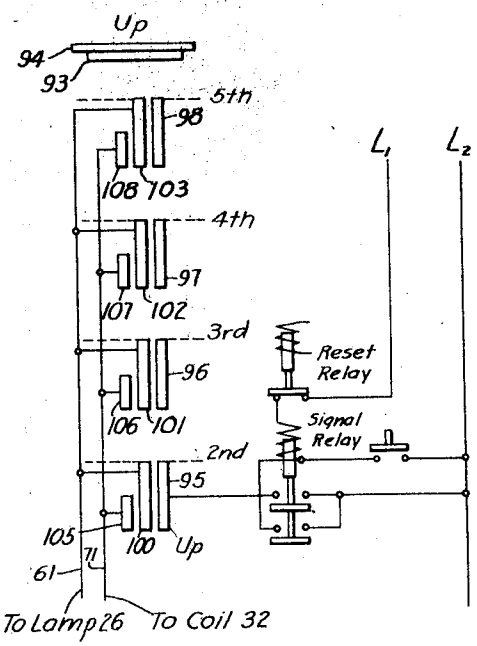


Fig. 5.



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UNITED STATES PATENT OFFICE

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SIGNALING SYSTEM FOR ELEVATORS

Application filed June 23, 1928. Serial No. 287,799.

My invention relates to signaling systems for elevators and more particularly to such systems as are employed for indicating to waiting passengers at a floor landing that a car will stop at that landing and the direction in which it is travelling.

The object of my invention, generally stated, is the provision of a signaling system that shall be simple and efficient in operation and capable of being readily and economically manufactured and installed.

A more specific object of my invention is to provide a signaling system in which a lamp, carried by an elevator car, may be employed to indicate to persons waiting at a floor landing that the car will stop at that landing.

It is also an object of my invention to provide a system for indicating to waiting passengers at a floor landing that cars will stop at that landing wherein a minimum number of parts are employed for accomplishing the desired result.

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

For an illustration of one of the many forms my invention may take, reference is to be had to the accompanying drawings, in which;

Figure 1 is a view, partly in front elevation and partly in section, of a portion of an elevator installation embodying my invention.

Fig. 2 is a view, partially in side elevation and partly in section, of the elevator installation disclosed in Fig. 1, and showing the lamp 26 as covering its maximum range.

Fig. 3 is an enlarged detail view, partly in side elevation and partly in section, of the signal lamp shown in Fig. 2, in active position with relation to the signal windows in one of the elevator doors, and covering only its restricted range.

Fig. 4 is a diagrammatic illustration of the circuits for the signal lamps embodied in the system, and

Fig. 5 is a diagrammatic illustration of a modification of my invention, as employed in connection with a signal system embodying a floor selector.

In the drawings, I have illustrated a car 11 as suspended in an elevator shaft, or hatchway 12 by a hoisting cable 13 in the usual manner. The elevator shaft 12 is shown as extending past the 2nd, 3rd, 4th and 5th floor landings and as being provided with elevator doors 14, 15, 16 and 17, at the landings, respectively. As indicated, each door is of the type that is constructed in three sections which nest together when the door is opened, the door 14 for the second-floor landing being in an open position, and the doors 15, 16 and 17 being in closed positions.

In order that passengers waiting at a floor landing may be informed when an approaching car will stop at that floor, each elevator door is provided with a pair of signal windows, one of which will be illuminated when a car decelerates to make a stop at that floor, the windows being designated, respectively, as 18 and 19 for the first floor, 20 and 21 for the the second floor, 22 and 23 for the third floor and 24 and 25 for the fourth floor. The windows may be of any desired configuration, but I prefer to employ a window outlined as an arrow pointing upward for the "up" signals and a window outlined as an arrow pointing downward for the "down" signals, as shown. to aid in indicating the direction of travel of the car when a stop is being signaled.

The means for illuminating the signal windows at the several floors to indicate the stops to be made, comprises an "up" signal lamp 26 disposed on the roof of the car to illuminate the "up" signal windows and a "down" signal lamp 27 mounted underneath the car to illuminate the "down" signal windows as the car approaches the floors when traveling in the respective directions.

Each of the signal lamps 26 and 27 is provided with a stationary reflector housing 29 and a movable reflector 30 (see Figs. 2 and 3). The movable reflector 30 is biased to the illustrated position in Fig. 2, by a spring 31, and an electromagnet 32 is provided for overcoming the biasing spring and moving the reflector to a retracted position in order that the extent of the area through which the rays

of light from the signal lamp to the signal windows may be controlled in accordance with the position of the car when it is decelerating, as will be hereinafter more fully explained.

In order that the signal lamps 26 and 27 and their movable reflectors may be operated in such manner as to illuminate the signal windows in accordance with the stops to be made, their circuits are connected to, and controlled by, a high-speed relay 33, an intermediate-speed relay 34, and a gate relay 49, as shown in Fig. 4, when the invention is employed in connection with an inductor landing system.

My invention may also be employed in connection with a signal system embodying a floor selector, such as the system disclosed in the Smalley and Reiners Patent No. 634,220, dated October 3, 1899. When the invention is employed in connection with a system of this character, the circuits for the signal lamps 26 and 27 and their movable reflectors are connected to corresponding contact segments on the floor selector and are controlled thereby, as shown in Fig. 5.

For the purpose of assisting in concentrating the light from the signal lamps 26 and 27 on the signal windows they are intended to illuminate, each pair of windows is provided with two cooperating groups of transverse reflectors 35 and 36. The reflectors 35 and 36 on the windows 22 and 23, for instance, are mounted at such angles that, when the car is approaching the 4th floor from below the floor, the light from the "up" signal lamp 26 will be reflected into the "up" window 23 by the reflectors 36, but will be prevented from illuminating the "down" window 22 (see Fig. 3) by the reflectors 35.

In order that the passengers at a floor landing may be given a visual indication, after the car has come to a stop, that the car is ready to take on passengers and also an indication as to the direction in which the car will proceed when restarted, an electric lamp 40 for indicating the "up" direction, and an electric lamp 41 for indicating the "down" direction are mounted within the car in such positions as to light up the open doorway when the elevator doors are open. The two lamps may be arranged to give distinctive indications in any suitable manner, as by differently coloring them.

Inasmuch as the lamp 40 remains lighted during the entire "up" trip as is hereinafter described and the lamp 41 remains lighted during the entire "down" trip, they may also be utilized for illuminating the interior of the car, as well as for signal purposes.

As shown in Fig. 4, the "up" direction lamp 40 is connected in circuit with a pair of contact members *b* on an up-direction-maintaining relay 42 and the down lamp 43 is connected in circuit with a pair of contact members *b* on a down-direction-maintaining relay 43, in order that the lamps may be selectively lighted in accordance with the direction the car is traveling. Relays 42 and 43 may be parts of the system for controlling movements of the elevator car, as is disclosed in my copending applications, Serial Nos. 221,415 and 201,419, filed Sept, 23, 1927, and June 25, 1927, respectively.

The means for causing the relays 42 and 43 to control the lighting of the lamps 40 and 41 in accordance with the direction of travel of the car, comprises an "up" limit switch ULA near the upper end of hatchway 12, and a "down" limit switch DLA near the lower end of hatchway 12 of a type which will operate through an extension 44 on the car 11 striking one of the pivotal extensions 45 and 46 on the limit switches to open the circuit momentarily as the car completes its upward or downward trip, the coil of relay 42 being connected in circuit with the "up" limit switch ULA, and the coil of relay 43 being connected in circuit with the "down" limit switch DLA.

The invention may be best understood by an assumed operation thereof.

Referring to Figs. 1, 2, 3 and 4 and assuming that the car 11 is on an up trip and has stopped at the second floor landing, and that the door 14 and the gate 47 are open to take on passengers, the signal light 40 in the car will be lighted by the up-direction-maintaining relay 42 so that it will shine through the open doorway to indicate that the car is stopping at the second floor landing and also to indicate that it is on an "up" trip.

The up-direction-maintaining relay 42 will be energized by a circuit that extends from supply conductor L1, through conductors 50 and 51, the coil of relay 42, conductor 52, the contact members *a* of relay 43, conductor 53, the contact members of up limit switch ULA and conductor 54, to supply line L2. The energization of the relay 42 will close its contact members *b* and thereby complete a circuit for lighting the "up" lamp 40 that extends from supply line L1, through conductors 55 and 56, lamp 40, conductor 57, the contact members *b* of relay 42, and conductors 58 and 59, to supply conductor L2.

Assuming now that the attendant on the car closes the car gate 47 and the elevator door 16, and continues the upward run to make a stop at the fourth floor, as the car approaches the proper slow-down zone for the fourth floor, the attendant moves the car switch to stop the car.

My signal system is best adapted for elevators having a control system which insures that the car will be stopped level with the floors and is illustrated as employed in connection with an automatic landing system in which devices operable in correspondence with movements of the car act to successively

deenergize the high-speed relay and the intermediate speed relay employed in the control system as the car successively passes predetermined points adjacent to the floors to thereby cause the car to be brought to a stop level with the floor landings. When the car 11 is running at high speed, both the intermediate-speed relay 34 and the high-speed relay 33 will be closed. A gate relay 49 will also be energized, since the car gate 47 is in closed position. Therefore, as the car 11 enters the slow-down zone, that is, passes the point at which deceleration should be initiated, for the stop at the fourth floor landing, the high-speed relay 34 will be deenergized, and its contact members *b* will close to energize the signal lamp 26 on the car 11 by way of a circuit that extends from supply conductor L1, through conductor 60, lamp 26, conductors 61 and 62, the contact members *a* of gate relay 49, conductor 63, the contact members *b* of high-speed relay 33, conductors 64 and 65, contact members *b* of up-direction-maintaining relay 42 and conductors 58 and 59, to supply line L2.

When my signal system is used in connection with elevators operating at relatively high speeds, such as 600 to 800 feet per minute, it has been found necessary that deceleration should be initiated when the car is more than one floor away from that floor at which it is desired to stop and, for this reason, it is necessary that light from lamp 26 shall be projected through a relatively large angle in order to illuminate a door signal which is more than one floor above the then position of the car. For this reason, I have shown the reflector 29 as having a stationary portion so arranged as to produce a beam of large angular extent. Hence, when the car is operating at high speed, the movable portion of the reflector will be retracted. It will be observed that, when the lamp 26 is energized, the movable reflector shield 30 will also be drawn back by the magnet 32 to permit the signal lamp 26 to throw its light rays upward to shine on the signal window 23 in the elevator door 16 at the fourth floor, so that waiting passengers at the fourth floor may have a visual indication that the elevator car 11 is travelling upward and will make a stop at the fourth floor. The circuit completed by the deenergizing of the high-speed relay 33 for operating the magnet 32 extends from supply conductor L1, through conductor 70, the coil of the magnet 32, conductor 71, the contact members *b* of intermediate speed relay 34, conductors 72 and 62, the contact members *a* of gate relay 49, conductor 63, the contact members *b* of high-speed relay 33, conductor 64, the contact members *b* of up-direction-maintaining relay 42 and conductors 58 and 59, to supply conductor L2.

As the car continues to travel toward the fourth floor and approaches more closely adjacent to it, the angular extent of the beam will be reduced to avoid projecting light upon the door for the fifth floor and, in order to confine the beam of light to the floor at which it is desired to stop, I provide the retracting magnet for the corresponding portion of the reflector with a circuit which extends through the intermediate-speed switch. Hence, as the car approaches that point at which deceleration from the intermediate speed should occur, the intermediate-speed relay is dropped out to open the circuit to the retiring or retracting magnet, and the reflector shield 30 will be moved to the position shown in Fig. 2 to confine the light from lamp 26 to the fourth-floor door.

Assuming now that the car 11 comes to a stop at the fourth-floor landing, and the elevator door 16 and the gate 47 are opened, the contact members 72 on the gate will be opened and thereby deenergize the gate relay 49 which will open its contact members *a* and thereby extinguish the signal lamp 26.

However, inasmuch as the elevator doors 16 and the elevator gate 47 have been opened, the up lamp 40, which remains lighted during the upward run of the car, will throw its light through the doorway and thereby indicate to persons waiting at the fourth floor that the car has stopped to take on passengers.

After the car completes its stop at the fourth floor and moves on up to the top of the elevator shaft, the projection 44 on the car 11 will strike the arm 45 on the up limit switch ULA and separate its contact members, thereby opening the circuit for the coil of the "up" direction-maintaining relay 42 and deenergizing the relay. As the relay 42 is deenergized, its contact members *b* open and thereby extinguish the "up" lamp 40.

At the same time, the contact members *a* of the relay 42 will close and complete a circuit for energizing the down-direction-maintaining relay 43 that extends from supply conductor L1, through conductors 50 and 75, the coil of "down" relay 43, conductor 76, the contact members *a* of "up" relay 42, conductor 77, the contact members of down limit switch DLA and conductor 78, to supply conductor L2.

The "down" relay 43, upon being energized, opens its contact members *a* and prevents current from flowing through the coil of the "up" relay 42, thereby preventing energization of that relay until the car moves to the ground floor and opens the down limit switch DLA.

At the same time that the "up" lamp 40 is extinguished, the closing of the contact members *b* on the "down" relay 43 completes a circuit for lighting the "down" lamp 41 that extends from supply L1, through conductors 55 and 80, down lamp 41, conductor 81, the

contact members *b* of down relay 43, conductors 82 and 59, to supply conductor L2.

Assuming now that the car starts on its down trip and receives a signal for a stop at the second-floor landing; as the car descends, the attendant centers his car switch to make the stop at the second floor and, when the car enters the slow-down zone for that stop, the high-speed relay 33 is deenergized. The deenergization of the relay 33 causes the signal lamp 27 to be lighted, and the reflector 30*a* to be moved, to a position where the light from the signal lamp will be thrown on the down-signal window 20, in a manner similar to that described in connection with the operation of the car in making the "up" stop at the fourth-floor landing.

It will be observed that the transverse reflectors for the down-signal arrows are arranged oppositely from those to the up-signal arrows. Hence, light from the signal lamp 27 will be transmitted only to the down-signal windows when the car is above the respective floors.

As the car continues decelerating and enters the intermediate-speed slow-down zone, the intermediate-speed relay 34 will be deenergized, and the reflector shutter 30*a* will be moved forward by its biasing spring 31*a* to throw the light from the lamp more directly on the signal window 20. As the car comes to a stop at the second floor, and the elevator door 14 and the car gate 47 are opened, the gate relay 49 will be deenergized, and the signal lamp 27 will be extinguished. However, inasmuch as the "down" lamp 41 in the car illuminates the open doorway when the car gate is open, the passengers at the landing will still be informed that the car is on a "down" trip and is ready to take on passengers.

Inasmuch as it may be desirable, at times, to employ my invention in connection with a system embodying a floor selector rather than in connection with the system just described, I have, in Fig. 5, shown how the circuits for the signal lamps 26 and 27 and their movable reflectors may be connected to a floor selector instead of to a high-speed relay and an intermediate-speed relay.

For the sake of simplicity, Fig. 5 shows only a small portion of an "up" section of a floor selector such as is employed in the signal system illustrated and described in my copending application, Serial No. 220,595, filed September 19, 1927, and assigned to the Westinghouse Electric and Manufacturing Company.

The portion of the signaling system illustrated in Fig. 5 comprises a passenger-operated push button 90, a push-button relay 91 for registering signals set up by the push-button 90, a reset relay 92 for resetting the push-button relay 91, after the registered signal is answered, and a portion of a floor selector. The part of the floor selector shown embodies contact segments for the first, second and third floors disposed to be engaged by a contact brush 93 on a selector arm 94. The contact segments 95, 96, 97 and 98 are connected to the signal-call circuits in such manner as to be energized when a stop signal is registered. The contact segments 100, 101, 102 and 103 are disposed to be connected to the conductor 61 leading to the signal lamp 26 and are disposed to be engaged by the brush 93 as it passes over the call-circuit segments 95, 96, 97 and 98, respectively.

The contact segments 105, 106, 107 and 108 are disposed to be connected to the conductor 71 leading to the coil of the magnet 32, for the purpose of causing the magnet to be energized when the brush 93 engages an energized segment connected with the signal circuit. It will be noted that the contact segments 105, 106, 107 and 108 are only approximately one-half as long as their associated signal lamp contact segments. The short length is provided in order that the magnet 32 may be energized during only the first part of the deceleration of the car in answering a stop call. In this manner, the movable reflector 30 will be drawn back when the car first enters a decelerating zone (on an "up" trip, for example), so that the light from the signal lamp 26 will be thrown upward on the signal window at the landing where the stop is to be made. However, when the car reaches the middle portion of its decelerating zone, the brush 93 will cease to engage the contact segment connected to the coil of the magnet 32 and, therefore, the magnet 32 will be deenergized and the reflector 30 will be moved out over the signal lamp, by its biasing spring 31, to a position where the light from the signal lamp will be thrown directly upon the signal window at the floor where the car is to stop.

It will thus be seen that I have provided a means for indicating to waiting passengers at a floor landing that a car will stop at such landing and also in the direction in which it is travelling that embodies a minimum number of parts and which will be easy to install and maintain.

Various modifications and changes may be made in the system illustrated herein as embody my invention without departing from the spirit and scope thereof, and all such modifications and changes are intended to be covered by the appended claims.

I claim as my invention:

1. In a signal system for an elevator car operable past a floor, a translucent signal window at said floor for each direction of elevator travel, and means including a lamp carried by said car, for illuminating the window at said floor corresponding to the direction in which said car is traveling as said car approaches said floor.

2. In a signal system for an elevator car operable past a floor, a translucent signal window at said floor, means including a lamp carried by said car for illuminating said window as said car approaches said floor, and means for directing light from said illuminating means to said window only when said car approaches said floor and is traveling in a predetermined direction.

3. In a signal system for an elevator car operable past a floor, a translucent signal window at said floor for each direction of car travel, illuminating means carried by said car for illuminating said windows as said car approaches said floor, and means for directing the light from said illuminating means to only one of said windows when the car approaches the floor from one direction and for directing the light to only the other of said windows when the car approaches said floor from the other direction.

4. In a signal system for an elevator car operable past a plurality of floor landings, a signal window disposed at each floor landing, a signal lamp carried by the elevator car for illuminating the signal window corresponding to the landing at which a stop is to be made to indicate to waiting passengers that a stop will be made, and means for preventing the signal lamp from illuminating more than one signal window at one time.

5. In a signal system for an elevator car operable past a floor landing, control means therefor, a signal window at said floor, a signal lamp carried by the elevator car and means operable responsive to actuation of the control to decelerate the car in making a stop at said landing for causing said signal lamp to illuminate said signal window.

6. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, an "up" signal window and a "down" signal window disposed at each floor landing, means for illuminating said windows carried by the elevator car and means operable responsive to actuation of the control to decelerate the car in making a stop at one of said landings to render said illuminating means effective and means dependent upon the direction said car is traveling for selectively causing said illuminating means to illuminate that signal window at said landing corresponding to the direction in which said car is traveling to indicate to waiting passengers at that landing that the stop will be made.

7. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, an "up" signal window and a "down" signal window disposed at each floor landing to be illuminated to indicate to waiting passengers the stops to be made by the elevator car and the direction of its travel, an "up" signal lamp and a "down" signal lamp carried by the car, means operable responsive to actuation of the control to decelerate the car to make a stop for selectively lighting one of the signal lamps to illuminate the signal window corresponding to the direction of travel of the car and the landing at which the stop is to be made, and reflectors associated with said signal windows to reflect light rays from the signal lamps to the windows.

8. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, an "up" signal window and a "down" signal window disposed at each floor landing to be illuminated to indicate to waiting passengers the stops to be made by the elevator car and the direction of its travel, an "up" signal lamp and a "down" signal lamp carried by the car, means operable responsive to actuation of the control to decelerate the car to make a stop for selectively lighting one of the signal lamps to illuminate the signal window corresponding to the direction of travel of the car and the landing at which the stop is to be made, and reflectors associated with said windows to prevent light rays from the "up" signal lamps from illuminating the "down" windows when the car is ascending and for preventing light rays from the "up" lamp from illuminating the "down" windows as the car approaches its stops.

9. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, a signal window disposed at a floor landing, a reflector associated with said window and disposed to prevent downwardly extending light rays from illuminating said window and for reflecting upwardly extending light rays to illuminate said window, a signal lamp carried by the elevator car and means operable responsive to actuation of the control to decelerate the car to stop at said landing for lighting said signal lamp to illuminate said signal window by means of said reflector.

10. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, an "up" signal window and a "down" signal window disposed at each floor landing for indicating to waiting passengers the stops to be made by the car, a signal lamp carried by the elevator car, means operable responsive to actuation of the control to decelerate the car for lighting said signal lamp when a stop is to be made, and means for directing the light from the lamp to that signal window corresponding to the floor landing at which the stop is to be made and the direction of travel of the car.

11. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, a signal window disposed at each floor landing, a signal lamp carried by the elevator car, means operable responsive to actuation of the control to deceler-

ate the car to make a stop for lighting the signal lamp to illuminate the signal window associated with the landing at which the stop is to be made to indicate that the stop will be made, and means for preventing the signal lamp from illuminating more than one signal window at one time.

12. In a signal system for an elevator car operable past a plurality of floor landings, control means therefor, a signal window disposed at each floor landing, a signal lamp carried by the elevator car, means operable responsive to actuation of the control to decelerate the car for causing the signal lamp to illuminate the signal window corresponding to the landing at which a stop is to be made to indicate that the stop will be made, and means also responsive to deceleration of the car for causing the light from said signal lamp to be directed to only that signal window corresponding to the floor landing at which the stop is to be made.

In testimony whereof, I have hereunto subscribed my name this 15th day of June, 1928.

FRANK E. LEWIS.