Sept. 10, 1963 C. SAVAGE 3,103,645

ELEVATOR POSITION INDICATOR SYSTEM

Filed Sept. 25, 1958 2 Sheets-Sheet 1

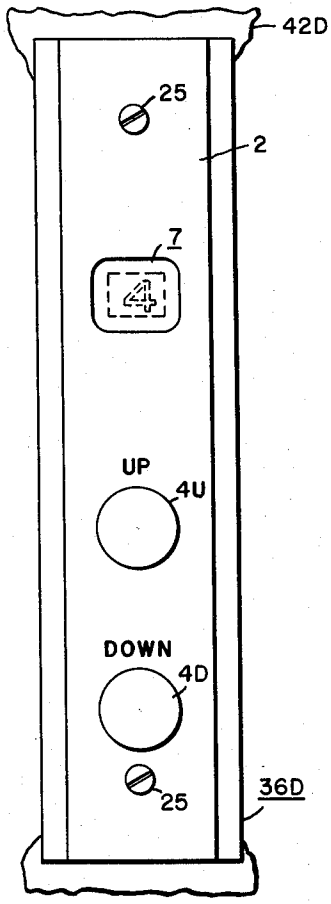


Fig. 1

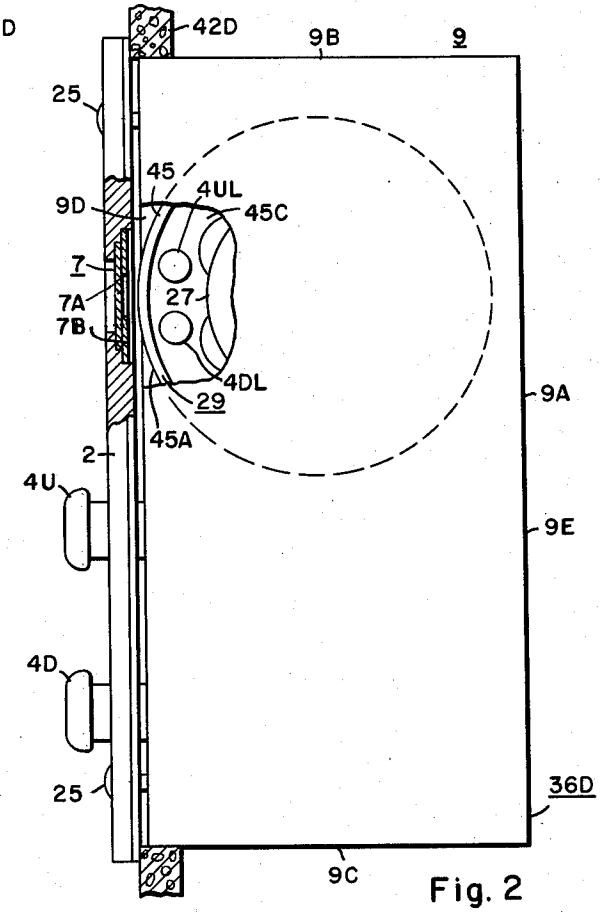


Fig. 2

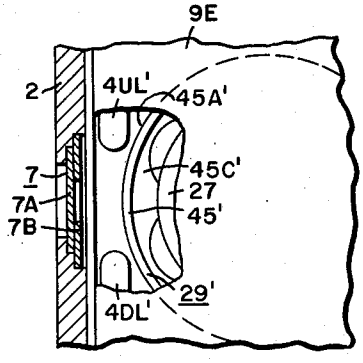


Fig. 4

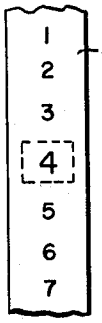


Fig. 3

WITNESSES

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ELEVATOR POSITION INDICATOR SYSTEM

Filed Sept. 25, 1958 2 Sheets-Sheet 2

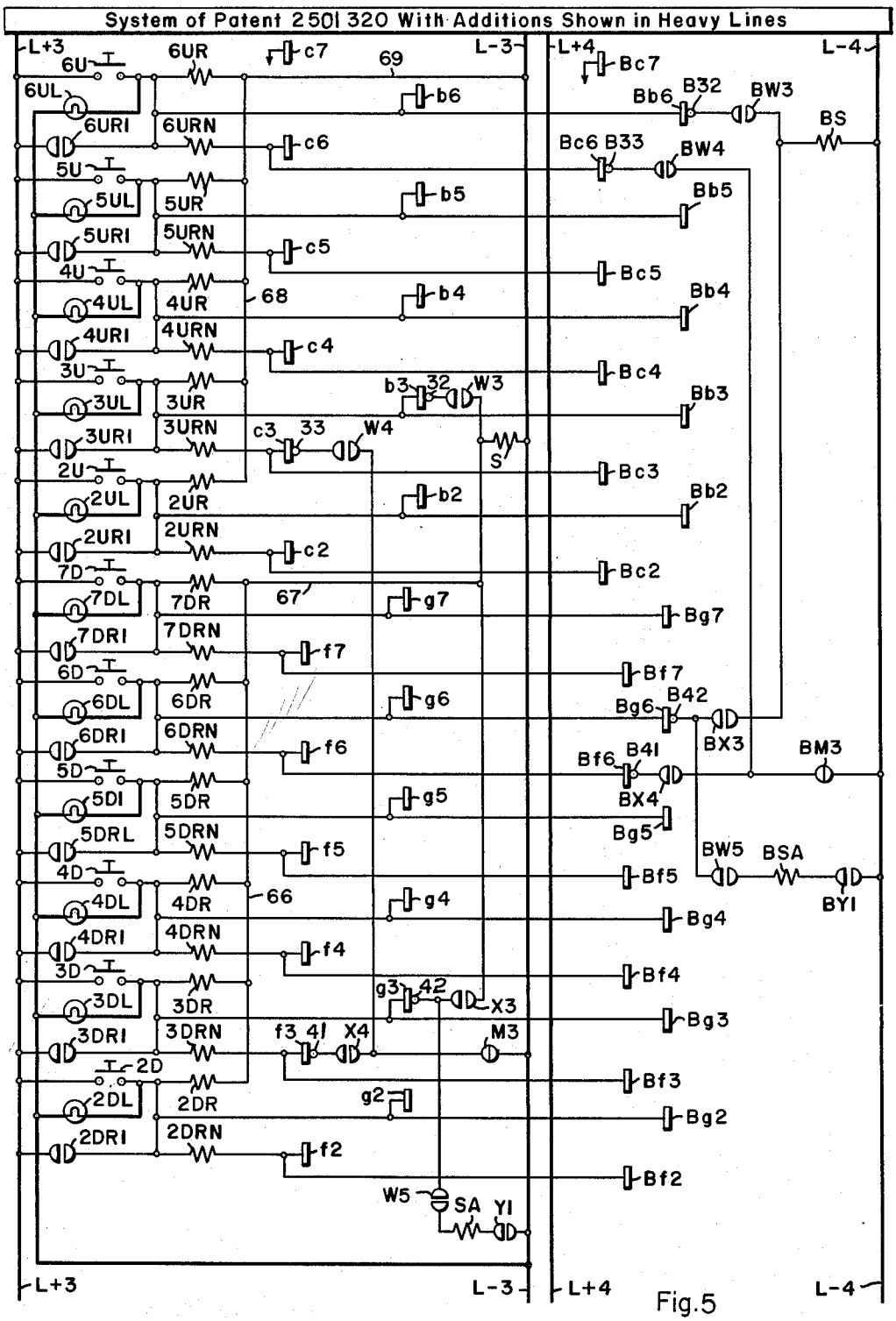


Fig.5

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3,103,645

ELEVATOR POSITION INDICATOR SYSTEM

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4 Claims. (Cl. 340—21)

This invention relates to position indicators and it has particular relation to position indicators employed in elevator systems.

In various systems, it is a practice to provide means for indicating at a remote point the position of a mobile device. For example, in an elevator system, it is a practice to provide an elevator car position indicator for each elevator car at one or more of the floors of the structure served by the elevator cars to inform prospective passengers of the location of the associated elevator car. Such a position indicator may take the form of a series of letters and/or numerals, each corresponding to a floor of the structure which is served by the associated elevator car. As the car moves with respect to the structure, suitable means are provided for designating the particular character corresponding to the floor adjacent which the elevator car is positioned. Thus, a pointer which moves synchronously with the elevator car may be employed to designate the appropriate floor letter or number; or a window may be provided for successively exposing indicia representing the position of the elevator car associated therewith, the indicia being disposed on a member such as a drum which is moved in accordance with movements of the elevator car by means of a notching or stepping motor. For illustrative purposes, the invention will be described in conjunction with the latter type of car position indicator.

In an elevator system it is also a practice to provide a plurality of floor station units, each operable for registering a call for elevator service for the associated floor. In a typical elevator system, a floor station unit may take the form of a push button station located at each of the floors served by the elevator car or cars of the system. In order to register a call for elevator service, a prospective or intending passenger at one of the floors may operate the push button for such floor. Conveniently, the floor station unit may include an up push button for registering calls for up service and a down push button for registering calls for down service.

In accordance with the invention, an elevator system is provided with a car position indicator whose indicia are illuminated when a floor station push button is operated to register a call for elevator service for the floor associated with the position indicator and the push button. The indicia may be illuminated by either an incandescent or a cold cathode gaseous discharge lamp, which is extinguished when the call for service is answered. Such operation appreciably extends indicia illuminating lamp life, as opposed to operation wherein a lamp is continuously energized to illuminate the indicia. Desirably, the lamp is located within the housing provided for the position indicator.

It will be observed that operation of an illuminating lamp in the foregoing manner may serve a dual purpose: to illuminate the position indicator indicia in order that they may be more easily observed by prospective or

intending passengers and to provide a signal for designating the registration of a floor call for elevator service. In a preferred embodiment of the invention, a separate lamp is associated with each floor station push button in elevator systems wherein both an up and a down floor call push button are provided for such floor station. Conveniently, each of the two lamps when energized may have a distinct color, each color thereby denoting the registration of a call for service in a specific direction.

It is, therefore, an object of the invention to provide improved means for indicating the position of a mobile device.

It is another object of the invention to provide means for improving the observability of the indicia for an elevator car position indicator.

It is a further object of the invention to provide an elevator system having an elevator car position indicator and an associated floor push button operable for registering calls for elevator service, wherein the indicia are illuminated in response to the operation of the associated floor push button.

It is an additional object of the invention to provide an elevator system as defined in the preceding paragraph, wherein the indicia are illuminated by means located within the position indicator's housing.

It is still another object of the invention to provide an elevator system as defined in either of the two preceding paragraphs, wherein the same illuminating means serves both to improve the observability of the car position indicator's indicia and to provide a signal for designating the registration of a floor call for elevator service.

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

FIGURE 1 is a view in front elevation of a push button station and associated car position indicator embodying the invention;

FIG. 2 is a view in side elevation, with parts broken away, of the push button station and associated car position indicator illustrated in FIG. 1;

FIG. 3 is a view in front elevation, with parts broken away, of a rotor assembly suitable for the car position indicator of FIGS. 1 and 2;

FIG. 4 is a fragmentary view of a modification of the embodiment of the invention illustrated in FIG. 2; and

FIG. 5 is a schematic view with circuits shown in straight-line form of an elevator system embodying the invention.

Various aspects of the invention are applicable either to an elevator system having a single elevator car or to a system having multiple elevator cars arranged in a bank to serve any desired number of floors. For illustrative purposes, the invention will be described with particular reference to an elevator system having a bank of two elevator cars which serve seven floors. In addition, the invention may be incorporated in any elevator system having floor station units, such as push buttons, for registering calls for elevator service and associated car position indicators. As heretofore mentioned, the invention will be illustrated in conjunction with a car position indicator which employs a notching or stepping motor.

The connection and operation of position indicators or signal units employing notching or stepping motors are well understood in the art. For example, reference may be made to my Patent 2,728,064 for a description of such a position indicator or signal unit. In order to simplify the presentation of the invention, it will be assumed that the signal unit herein described is employed in place of the signal unit 36C of my aforesaid patent.

Referring to the drawings, FIG. 1 shows a signal unit or push button station 36D which may replace the signal unit 36C of my aforesaid patent. It will be assumed that the signal unit 36D is located at the fourth floor of the structure served by the elevator system. The signal unit 36D includes a face plate 2 which has an opening for reception of a down push button 4D, an opening for the reception of an up push button 4U, and a window 7 for exposing indicia representing the position of the elevator car associated with the push button station. The push buttons 4D and 4U correspond to the push buttons 4 and 5, respectively, of my above-named patent.

A signal unit similar to that illustrated herein in FIG. 1 is employed at each of the intermediate floors served by the associated elevator car. A similar signal unit may be employed for the upper terminal floor, but the up push button may be omitted for such floor. Also, a similar signal unit may be employed for the lower terminal floor, but the down push button preferably is omitted for the lower terminal floor. (In certain systems the up push button also may be omitted for the lower terminal floor.) It will be understood that the signal unit 36D is positioned in the corridor wall 42D, which corresponds to the corridor wall 42C of my above-mentioned patent. Preferably, one of the signal units is positioned in the corridor wall for each floor adjacent the hoistway of the elevator car associated therewith.

If the push buttons 4D and 4U are common to all of the elevator cars of the system, the push buttons may be omitted for all but one of the signal units provided for any given floor. In elevator systems having two elevator cars arranged in adjacent hoistways, a dual signal unit may be located at each floor served by the bank of elevator cars. Thus, two car position indicators, one for each of the two adjacent elevator cars, may be located in a common housing. Such a dual signal unit is described in detail in my aforesaid patent.

As is shown in FIG. 2, the signal unit 36D includes a rectangular box or housing 9 which may be constructed in any suitable manner from sheet material such as sheet steel. The housing is mounted in the corridor wall 42D and is secured to the wall in any suitable manner (not shown). The housing has a rear wall 9A, an upper wall 9B, a lower wall 9C, a first side wall 9D and a second side wall 9E.

Each of the push buttons 4D and 4U is positioned to operate a spring biased switch (not shown). When actuated to the right as viewed in FIG. 2, each of the push buttons operates its associated switch to establish an electrical connection between the terminals thereof. Electrical connections from these switches extend to the machine room of the associated elevator car through suitable knockouts (not shown) in the housing 9.

The face plate 2 is secured to the housing 9 by means of machine screws 25 and covers the opening in the wall 42D which receives the housing 9.

Disposed within the housing 9 is a car position indicator. This position indicator includes a notching or stepping motor having a stator 27 and a rotor 29. The rotor 29 includes a drum or cup 45 which has a substantially cylindrical peripheral surface 45A and a radial wall 45C. The drum 45 is mounted for rotation about its axis by means of a hub (not shown) concentric with the peripheral surface 45A. The drum conveniently may be molded of any suitable material. Preferably, the drum

is molded as an integral unit from a transparent or translucent plastic such as an acylic resin which is commercially available under the proprietary name of Lucite.

The drum 45 has engraved or otherwise applied to its peripheral surface 45A suitable indicia representative of the floors served by the associated elevator car. For example, as is shown in FIG. 3, the indicia 1, 2, 3, 4, 5, 6 and 7 are engraved on the surface of the drum to represent, respectively, the first through the seventh floors serviced by the elevator car. As the elevator car moves, these indicia are successively exposed through the window 7.

By inspection of FIG. 2, it will be observed that the window has a transparent sheet of glass 7A thereacross, the glass being secured in position by a mask plate 7B having an opening which defines the portion of the drum 45 which is available for observation. The portion of the drum which is available for observation is represented in FIG. 3 by a broken line.

With the proportions herein illustrated, the drum is rotated through an angle of 15° for each notch or step thereof. For this reason, the successive indicia on the face of the drum may be spaced from each other about the axis of the rotation of the drum by an angle of 15°.

Operation of the position indicator notching or stepping motor is described in detail in my aforesaid patent, and it appears that it is unnecessary to repeat such description herein.

Disposed within the drum or cup 45 of the rotor 29 and adjacent the window 7 are the two lamps 4DL and 4UL, which are mounted in any suitable manner. These lamps are associated respectively with the push buttons 4D and 4U. By means of circuitry which hereinafter will be described, the lamp 4DL is energized when the push button 4D is operated to register a down floor call for elevator service, and the lamp 4UL is energized when the pushbutton 4U is operated to register an up call for elevator service. Thus, since the drum 45 may transmit light therethrough, the indicia disposed on the peripheral surface 45A thereof are illuminated when either of the lamps is energized. Such illumination makes the indicia more easily observable through the window 7. It will be understood that similar indicia illuminating lamps may be provided for the remainder of the car position indicators associated with the elevator system.

In the embodiment of the invention illustrated in FIG. 4, a rotor 29′ similar to the rotor 29 of FIG. 3 is spaced from the window 7 sufficiently to enable the lamps 4DL′ and 4UL′ to be mounted in front of the peripheral surface 45A′ of the drum 45′. In this embodiment, the drum may be molded of a non-magnetic material such as a phenolic resin. The lamps 4DL′ and 4UL′ of FIG. 4 are associated with push buttons similar to the push buttons 4D and 4U of FIG. 2 and are energized in a manner similar to that by which the lamps 4UL and 4DL of FIG. 2 are energized.

Any suitable call registered signal circuit may be employed to energize the lamps 4DL and 4UL. For example, the call registered signal circuit disclosed in the Eames application, Serial Number 374,460, filed August 17, 1953, now Patent Number 2,852,756, which was issued September 16, 1958, may be used. For the purpose of illustration, however, it will be assumed that the call registered signal circuit illustrated in FIG. 5 will be used to energize the lamps. As is noted in FIG. 5, FIG. 5 is intended to employ the complete elevator system of the Eames Patent 2,501,320, which was issued March 21, 1950 with certain additions which are shown in heavy lines. It should be noted that the present FIG. 5 includes a reproduction in its entirety of FIG. 4 of the Eames Patent 2,501,320.

It will be observed that the present FIG. 5 illustrates control circuits for two elevator cars, which are designated cars A and B. Inasmuch as similar circuits are

provided for each of the elevator cars, a corresponding component for the elevator car B is identified by the reference character employed for the component associated with the elevator car A but preceded by the letter B to indicate that the component under consideration is associated with the elevator car B. It will be understood that the elevator car B and all components specific thereto may be omitted if a single car system is desired.

Apparatus common to the Eames Patent 2,501,320 and to the present FIG. 5 may be listed as follows:

Apparatus Individual to Car A

S	Floor call stopping relay.
M3	Contacts of car running relay.
X3 and X4	Contacts of down direction preference relay.
W3 and W4	Contacts of up direction preference relay.
L+3, L−3	Direct current buses.
b2 to *b6*, *c2* to *c7*, *f2* to *f7*, *g2* to *g7*	Contact segments on floor selector.
32, 33, 41, 42	Brushes of floor selector.

Apparatus Common to Both Cars

2DR to 7DR	Down call-storing relays.
2UR to 6UR	Up call-storing relays.
2DRN to 7DRN, 2URN to 6URN	Cancellation coils for storing relays.
2D to 7D	Down floor buttons.
2U to 6U	Up floor buttons.

For a complete description of the apparatus set forth in the above lists, reference may be made to the aforesaid Eames patent. However, to facilitate an understanding of the invention, a brief resume of typical operations now will be given.

The circuits illustrated in detail in FIG. 5 are intended for operation to register calls for elevator service from the floors of the structure or building served by the elevator cars. For example, if a prospective passenger at the fourth floor desires to register a call for service in the up direction, he presses the push button 4U to connect the up-call-storing relay 4UR across the buses L+3 and L−3. The energization of the up call-storing relay 4UR results in closure of the holding contacts 4UR1 to establish a holding circuit around the push button 4U.

The first available elevator car to approach the fourth floor while set for travel in the up direction stops at the fourth floor to answer the call for service. For example, if the elevator car A is set for travel in the up direction and is approaching the fourth floor, the brush 32 engages the contact segment *b4* to complete the following stopping circuit:

L+3, 4UR1, *b4*, 32, W3, S, L−3

The energization of the floor call stopping relay S conditions the elevator car A to stop at the fourth floor.

If the elevator car A stops at the fourth floor, the brush 33 engages the contact segment *c4* to complete the following cancelling circuit:

L+3, 4UR1, 4URN, *c4*, 33, W4, M3, L−3

The energization of the cancelling coil 4URN resets the up call storing relay 4UR, and the relay opens its make contacts 4UR1 to interrupt the energization of the relay and of the cancelling coil.

Each of the up push buttons 2U to 6U similarly is associated with its up call-storing relay.

In a similar manner, each of the push buttons 2D to 7D may be pressed to register a call for elevator service in the down direction. For example, if the push button 4D is pressed, the down call storing relay 4DR is connected across the buses L+3 and L−3 for energization. This relay closes its make contacts 4DR1 to establish a holding circuit around the push button. The first available elevator car set for travel in the down direction which approaches the fourth floor is stopped in response to the registered call. For example, if the elevator car A is the first available car to reach the fourth floor under these conditions, the following stopping circuit is completed:

L+3, 4DR1, *g4*, 42, X3, S, L−3

The energization of the floor call stopping relay S stops the elevator car A at the fourth floor in a manner which is clearly set forth in the aforesaid Eames Patent 2,501,320.

As the elevator car A stops at the fourth floor, the brush 41 engages the contact segment *f4* to complete the following cancelling circuit:

L+3, 4DR1, 4DRN, *f4*, 41, X4, M3, L−3

The energization of the cancellation coil resets the down call-storing relay 4DR, which opens its make contact 4DR1 to de-energize the relay 4DR and the cancelling coil 4DRN.

Each of the push buttons has associated therewith a signal device which preferably is in the form of a lamp. Each lamp is designated by the letter L preceded by the reference character of the push button with which the lamp is associated. For example, the lamp 4UL is associated with the push button 4U, and the lamp 4DL is associated with the push button 4D (see also FIG. 2).

Each of the lamps has one terminal connected to that terminal of the associated push button which is connected to the associated call storing relay. The remaining terminal of the lamp is connected to the bus L−3.

A similar energizing circuit is associated with each of the lamps for each of the push buttons.

Although each lamp may be of the low-wattage cold-electrode gaseous-discharge type, preferably it is an incandescent filament lamp. Lamps of the former type sometimes are referred to as neon lamps if the gas contained therein is primarily neon.

If desired, the lamps associated with the push buttons may have distinct colors. For example, lamps associated with the up push buttons may be designed to produce a white color, whereas lamps associated with the down push buttons may be designed to produce a red color.

It is believed that the operation of the lamps now may be set forth. Let it be assumed that a prospective passenger at the fourth floor presses the push button 4U to register a call for service in the up direction. As a result of such pressure of the push button, the up call storing relay 4UR is energized and closes its holding contacts 4UR1. It will be noted that the lamp 4UL now is energized through the following circuit:

L+3, 4UR1, 4UL, L−3

The energization of the lamp continues until the relay 4UR is reset to open its contacts 4UR1. Each of the lamps is similarly energized in response to operation of its associated push button.

Referring to FIG. 2, it will be observed that upon the registration of floor calls for elevator service, the lamps 4DL and/or 4UL serve to illuminate the indicia disposed on the peripheral surface 45A of the drum 45 of the car position indicator. Similarly, the lamps provided for the other car position indicators of the system will illuminate the indicia associated therewith upon the registration of floor calls for elevator service. In addition, it will be noted that the energized lamps may serve as call registered signals, and if the up and down call lamps have distinct colors, such colors will denote the registration of a call for service in a specific direction. If dual signal units are provided as aforementioned, each lamp conveniently

may illuminate the indicia for both of the elevator cars.

If, however, a separate position indicator is provided for each car and if the floor call registering push buttons for each floor are common to all of the elevator cars of the system, an additional lamp may be connected in parallel with each of the lamps 2DL through 7DL and 2UL through 6UL to illuminate the indicia for each additional position indicator at each floor upon the registration of a floor call for elevator service for the associated floor.

If desired, up floor-call registering and floor-call registered signal circuits similar to those described above may be provided for the first floor. Such circuits, however, are not here illustrated.

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.

I claim as my invention:

1. In an elevator system, a structure having a plurality of landings including a first terminal landing, a second terminal landing and an intermediate landing located between the terminal landings, an elevator car, means mounting the elevator car for movement in two directions relative to the structure to serve the landings, landing first call registering means operable from said intermediate landing for registering a call for elevator service in a first of said two directions, first cancelling means for cancelling a call registered by said landing first call registering means, landing second call registering means operable from said intermediate landing for registering a call for elevator service in the second of said two directions, second cancelling means for cancelling a call registered by said landing second call registering means, indicating means disposed at said intermediate landing, said indicating means having indicia for designating the position of the elevator car with respect to the structure, and illuminating means responsive to the registration of a landing first call by said landing first call registering means for said intermediate landing for illuminating said indicia during the period between the initial registration of said landing first call and the cancellation thereof by said first cancelling means, said illuminating means also being responsive to the registration of a landing second call by said landing second call registering means for said intermediate landing for illuminating said indicia during the period between the initial registration of said landing second call and the cancellation thereof by said second cancelling means, said illuminating means having a first characteristic indicative of the registration of said landing first call, said illuminating means having a second characteristic indicative of the registration of said landing second call.

2. In an elevator system, a structure having a plurality of landings including a first terminal landing, a second terminal landing and an intermediate landing located between the terminal landings, an elevator cars, means mounting the elevator car for movement in two directions relative to the structure to serve the landings, landing first call registering means operable from said intermediate landing for registering a call for elevator service in a first of said two direction, first cancelling means for cancelling a call registered by said landing first call registering means, landing second call registering means operable from said intermediate landing for registering a call for elevator service in the second of said two directions, second cancelling means for cancelling a call registered by said landing second call registering means, indicating means disposed at said intermediate landing, said indicating means having indicia for designating the position of the elevator car with respect to the structure,

first illuminating means responsive to and indicative of the registration of a landing first call by said landing first call registering means for said intermediate landing for illuminating said indicia solely during the period between the initial registration of said landing first call and the cancellation thereof by said first cancelling means, and second illuminating means responsive to and indicative of the registration of a landing second call by said landing second call registering means for said intermediate landing for illuminating said indicia solely during the period between the initial registration of said landing second call and the cancellation thereof by said second cancelling means.

3. In an elevator system, a structure having a plurality of landings including a first terminal landing, a second terminal landing and an intermediate landing located between the terminal landings, an elevator car, means mounting the elevator car for movement in two directions relative to the structure to serve the landings, landing first call registering means operable from said intermediate landing for registering a call for elevator service in a first of said two directions, first cancelling means for cancelling a call registered by said landing first call registering means, landing second call registering means operable from said intermediate landing for registering a call for elevator service in the second of said two directions, second cancelling means for cancelling a call registered by said landing second call registering means, indicating means disposed at said intermediate landing, a housing for said indicating means, said indicating means having indicia for designating the position of the elevator car with respect to the structure, said housing having an aperture for viewing the one of said indicia which designates the position of the elevator car at any given time, first illuminating means responsive to the registration of a landing first call by said landing first call registering means for said intermediate landing for illuminating said one indicium with a first color solely during the period between the initial registration of said landing first call and the cancellation thereof by said first cancelling means, and second illuminating means responsive to the registration of a landing second call by said landing second call registering means for said intermediate landing for illuminating said one indicium with a second color solely during the period between the initial registration of said landing second call and the cancellation thereof by said second cancelling means, said first and second illuminating means being disposed within said housing.

4. In an elevator system, a structure having a plurality of landings, an elevator car, means mounting the elevator car for movement relative to the structure to serve the landings, landing call means operable from a landing for registering calls for elevator service from the associated landing, first means disposed at said associated landing and responsive to a system condition for providing a predetermined visual indication, and second means responsive to the registration of a landing call by said landing call means for said associated landing for illuminating said first means solely during the period in which such call is registered.

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