This invention relates to automatic elevators as are used in groups in commercial buildings and in particular to means for directing passengers at a lobby floor to the next car to leave that floor in the regular dispatching sequence.

It has been customary to provide illuminated signs adjacent or in the lobby doors to the various elevator cars of a bank to indicate which car is next to depart in the regular dispatching sequence. Many people disregard these signs and enter any car that may be standing at the lobby floor with its doors open. Those entering cars other than the next to leave are thereby inconvenience by having to wait an additional period of time before their car leaves the floor and takes them to their destination. It has also been observed that intending passengers at a lobby floor will almost invariably enter a lighted car if two cars are standing at the floor one with its lights turned on and the other with its lights dimmed or turned off.

The principal object of this invention is to provide automatic means for dimming or extinguishing the interior lighting of elevator cars standing at a terminal floor and awaiting their loading signals.

Another object of the invention is to provide automatic means for extinguishing the interior lighting of an elevator car a short time after it arrives at the lower terminal floor and re-establishing the interior lighting when the car is selected as the next to be dispatched and is therefore ready to receive passengers.

Another object of the invention is to provide entrance illumination for any car standing at the terminal floor during a long period of time, while it is receiving passengers preparatory to the next trip.

Another object of the invention is to direct prospective passengers to the proper elevator car by varying the level of illumination at the entrance way to the cars, that one next to leave being brightly illuminated and the others being dimly illuminated or completely darkened.

More specific objects and advantages are obtained from automatic controls constructed according to the invention.

According to the invention the interior illumination of an elevator car and local illumination of the doorways for each of the cars is controlled by the dispatching relay system of the elevators. The relay system is arranged so that the local illumination of the elevator entrance way is increased when that particular elevator has been selected as the next to be dispatched and prior to its actual dispatching. The interior illumination of the elevator car is arranged to be at normal brilliance while the car is operating away from the terminal floor and while it is standing at a terminal floor for a brief interval after its arrival and again when it is selected to be the next car to be dispatched or has received its dispatching signal.

Equipment for operating an elevator according to the invention is illustrated in the accompanying drawings.

In the drawings:

FIGURE I is a front view of a lobby entrance of a four car bank of elevators.

FIGURE II is a schematic wiring diagram showing the control circuits that are employed in dispatching and controlling the car illumination.

FIGURE III is a schematic wiring diagram of the portions of the control circuits specific to one car and entrance way illumination means.

FIGURE IV is a simple schematic diagram of an alternative method of controlling the car illumination level.

FIGURE V is a simple schematic diagram of another arrangement for controlling the car lights.

These specific figures and the accompanying descriptions are intended merely to illustrate the invention but not to impose limitations thereon.

Referring to FIGURE I a bank of elevators may include a number of elevator cars 1, 2, 3, and 4. An up call bell button 5 located between cars 2 and 3 may be used to register up calls for service when the elevators are operating under light traffic conditions while only one or two cars may be in operating condition. Normally, the cars are arranged to return to the lower terminal floor as soon as free so that cars are always available at the terminal without calling them. The elevator cars 1, 2, 3, and 4 are provided with loading signal lights 6, 7, 8 and 9 in the form of spot lights adapted to brilliantly illuminate the floor area in the entrance way to each of the elevators when the car is to receive passengers.

In addition each of the cars are provided with an interior illumination fixture such as the fixture 10 of car 1, 11 of car 2, 12 of car 3.

As shown in FIGURE I three of the cars namely cars 1, 2 and 3 are standing at the lower terminal floor with their doors open. Car 4 is elsewhere in its hatchway and its lobby door is closed. For purposes of illustration it is assumed that car 1 has received its dispatching signal, that car 2 is selected as being the next to leave and that car 3 has arrived at the lower terminal and has discharged its passengers. Under this condition the entrance signal light 6 of car 1 would be deenergized or darkened while the interior illumination source 10 would be on and the doors would be ready or starting to close.

When the dispatching signal was given to car 1, car 2 was selected as being the next to be dispatched and its interior illumination from the lighting fixture 11 as well as the entrance illumination from the signal light 7 both came on to attract prospective passengers to this car. The lighting fixtures 8 and 12 for car 3 are de-energized at this time so that that car is very dimly illuminated or is completely darkened.

Prospective passengers thus attracted to car 2 under the circumstances assumed even though car 1 is still illuminated and has its doors open. The extinguishing of the signal light 6, however, is a warning that the doors of car 1 may close before a prospective passenger could reach those doors and enter the car.

Circuits for controlling the car selection for dispatching and for controlling a lighting relay one for each of the cars for controlling the interior illumination are illustrated in FIGURE II.

In the equipment illustrated in FIGURE II there are three relays for each of the four cars, thus near the top of the figure are four relays marked BT1, BT2, BT3, BT4. These are both terminal relays and are energized through the corresponding car's floor selector machine as long as the car is standing at the bottom terminal. Next are a set of four relays, a set for each car, which are used as the loading relays marked CUL1, CUL2, CUL3, and CUL4. These serve as car selection relays and are arranged so that only one may be energized at a time and that corresponding to the next car to be dispatched. Near the bottom of the figure are four relays marked CUD1, CUD2, CUD3 and CUD4. These four relays are the dispatching relays and serve to transmit dispatching signals to each of the four cars when it is time for the respective cars to leave the bottom terminal.
To facilitate tracing circuits each of the lines of the diagram is numbered and adjacent each line number is a symbol corresponding to any relay coil that may be located in that numbered line. To the right of each symbol in this code strip is a series of numbers which identify the lines at which contacts operated by that particular relay coil are shown. Thus the number and locations of the contacts operated by each relay coil may be readily determined by noting the numbers in the code. An underscored code number indicates that that particular relay contact is closed when the operating coil is deenergized.

When an elevator car reaches the lower terminal it prepares a circuit which may or may not be immediately completed from a direct current power lead L1 through its selector machine brush 15, then through normally closed down dispatch relay contacts CUD, then through operating coil of its loading relay CUL, and thence through another set of normally closed down dispatch relay contacts CUD to a lead 16 which is connected through a series of normally closed loading relay contacts CUL shown in a vertical line extending from lines 5 to 10 inclusive, and then through an inductance coil 17 connected to the return power line L2. To trace the operation of this part of the circuit consider that no cars are present at the bottom terminal and that car 1 is the first to arrive. As car 1 arrives at the lower limit it prepares and, since no other car is at the terminal, completes a circuit from the lead L1 through the brush 15 in line 11, thence through the up selection relay CUL1 in line 11 and through the series of normally closed contacts shown from line 5 to line 11. As soon as current builds up in the inductance coil 17 in this circuit the relay CUL1 pulls in so as to close its contacts CUL1 in line 12 to complete a sealing circuit at the same time it opens its contacts CUL2 in the series circuit at line 11 to break the circuit through the inductance coil 17. By breaking this circuit no other up loading relay CUL can be energized as long as this relay is energized.

The loading relay CUL, by contacts shown in FIGURE III, lines 31 and 37, provides bright illumination conditions in the car and in the entrance way.

Simultaneously the bottom terminal relay BT1 in line 1 is energized and power is supplied through lead 18 to the dispatching relay coil CUD in line 19 so that it may be energized as soon as conditions are ready for dispatching.

Under the assumed conditions none of the dispatching relays CUD are energized. With car 1 at the lower terminal, the next dispatching signal, which is evidenced by closure of contacts SCC in line 18, permits current to flow from the selector machine through the lead 18 to the dispatching relay coil CUD in line 19, thence through its contacts CUD1, now closed contacts CUL1 in line 19, through leads 19 and 20 to a series of normally closed contacts CUD one on each of the dispatching relays CUD and then through contacts SS (closed as long as there is a demand for service) in line 18 and now closed contacts SCC, also in line 18 to the return lead L2. Closure of the dispatch relay coil CUD1 causes it to close its contacts CUD1 in line 20 to establish a holding circuit through lead 21 connected to the return lead L2 in line 12, and open its contacts CUD1 in line 11 to deenergize the up loading relay CUL1. This relay thereupon immediately releases so as to reclose its contacts CUL1 in series circuit at line 11.

The deenergization of the loading relay opens its contacts in lines 31 and 37, FIGURE III, to deenergize the light sources. The car lights remain bright since the dispatch relay coil CUD has closed its contacts in line 32.

If during this interval another car, for example, car 2 had arrived at the bottom terminal floor such that its brush 15 on its selector machine closed its operating contact, current can now flow (in line 9) through the brush 15, the up dispatch relay contacts CUD2 of the second elevator, then through its up loading relay coils CUL2 and another set of up dispatch relay contacts CUD2 connected to the line 16, which, in turn, is connected to the return lead L2 through the up loading relay contacts CUL2, CUL2, CUL3, and CUL4 and the inductance coil 17. The second relay thereupon is energized as soon as the first car received its dispatch signal. If the third or fourth car had come into the bottom terminal during this interval before the first car received its dispatch signal only one coil CUL2, CUL3, CUL4 would have been energized. This is accomplished by varying the pull-in current or sensitivity of the relays and retarding the current built up in the coils by means of the inductance coil 17. The first relay to operate seals in and breaks the circuit to the others. Thus if several cars are standing at the lower terminal when one car receives its dispatch signal the next car to leave is selected according to its order in the bank rather than the time of its arrival.

As soon as the first car leaves the bottom terminal in response to its dispatching signal it breaks the contact between its brush 15 in line 11 and the selector machine contact so as to deenergize the up dispatch relay CUD1 and its bottom terminal relay BT. The relays thereupon release and in so doing relay coil CUD1 re-establishes the series circuit from the lead 20 through the dispatch relay contacts and the contacts SS and the dispatch machine contacts SCC in line 18, and relay BT, among other things, closes contacts CUD1 of FIGURE III to keep the bright lights on in the car 1.

The elevator cars may be dispatched immediately upon arrival allowing time only for unloading by closing the program timer contacts H3 in line 13 thereby by-passing the series circuit of dispatch relay contacts CUD1 to CUD4 inclusive. When this contact H3 is closed each of the dispatching relays CUD is energized very quickly after the corresponding car reaches the lower terminal. The sequence in this case is to first energize the up loading relay CUL. As soon as this relay coil pulls in it closes its contacts to energize the corresponding dispatch relay CUD and if, in turn, deenergizes the up loading relay so that the loading relay circuits respond to the next car to arrive whether the preceding car leaves immediately or not.

The cars also may be dispatched immediately in order of arrival by closing contacts HP4 in line 17. Under this condition only one car at a time may arrive and receive a dispatch signal by energizing its CUL relay but as soon as one of the CUL relays is energized it in turn energizes the corresponding dispatch relay CUD without waiting for a dispatch signal. The CUL relay in turn deenergizes the corresponding up loading relay so that the loading relay circuit may select the next car to leave but the signal cannot be transferred to the up dispatch relay CUL until the previously selected car has departed from the floor so as to deenergize its dispatch relay and complete the series circuit of contacts CUD1 through CUD4.

As previously mentioned, the contacts SS in line 18 are included to prevent transmitting a dispatching signal to a car unless there is a call for service. In the ordinary installation contacts SS are included as part of the signal circuit and are closed as long as there is a call for service registered.

FIGURE III shows the circuits that directly control the sources of illumination for the interior of the car and the entrance way to the car. These circuits are duplicated for each of the cars. The equipment shown in FIGURE III includes a flux decay or similar type of timing relay LT used to control the lighting circuits. This relay LT is energized by way of normally closed contacts BT, line 30, of the bottom terminal relay or normally open contacts CUL, line 31, of the corresponding up loading relay CUL, the up dispatch relay contacts CUD, line 32, or contacts PC (line 33) of a photocell relay operated by a light source 38 and photocell 39 arranged to close the circuit to the timing relay LT whenever the light beam is broken by a person leaving or entering the car. The lower part of FIGURE III illustrates the circuits directly
energizing the light sources. These circuits are ordinarily fed from alternating current power leads L3 and L4. Power for the entrance light which may also include the signal light is taken from the lead L3 through contacts CUL, line 37, of the up loading relay and then through the entrance light and back to L4. Thus the entrance light is on as long as a car is standing at the lower terminal and is selected as the next car to receive a dispatch signal.

The elevator car interior may be illuminated by either or both of two sources, the first source providing the light and the other bright illumination. The dim illumination is provided by dim car lights 30, shown in line 35, which are energized from the lead L3 by way of a first switch 31 (the usual light switch in the car) and a second manually operated switch 32. As long as both switches are closed the car is dimly illuminated. Bright lights 33 for the car, which may be included in the fixtures 10, 11 or 12, are controlled through the first manually operated switch 31 and normally open contacts LT, line 36, of the light timing relay LT shown in line 31, the contacts in line 36 being in series with the bright illumination means 33. Therefore, as long as the light switch 31 is turned on and the light timing relay is energized both light sources 30 and 33 are energized to provide bright illumination in the car.

When the car arrives at the lower terminal relay contacts BT in line 30 are immediately opened. If the car is not immediately selected for loading or dispatching causing closing of contacts CUL or CUD respectively no one is in or passing through the door the circuit feeding the coil of the timing relay LT is broken and after a brief interval of time, the usual unloading time, this relay releases so as to open its contacts LT, line 36, in series with the bright light source. Therefore, the lights will stay on for a long enough period of time to allow passengers within the car to leave the car before the bright lights are turned off. As soon as the car is selected as being the next car to be dispatched, which is by way of the up loading relays CUL, the light timing relay is again energized so as to again supply power to the bright car lights 33.

This circuit also provides means, the circuit in line 37 including the contacts CUL, for energizing the light at the entrance to the elevator only during the loading period, turning the entrance light off when the car is given its dispatch signal and maintaining the interior illumination of the car during the loading and dispatching time and after the car is away from the lower terminal. It further provides means for decreasing or eliminating the car illumination when the car is standing idle at the first floor.

Should it be desired to leave the car in total darkness while it is idle the switch 32 is left open so that the dim car lights are never used.

FIGURE IV illustrates another means for energizing the bright car lights and in this figure car lights 35 are energized from an alternating current lead L5 by way of a light switch 36, contacts LT of a light timing relay, which may be the same as the relay shown in line 31, and then through the lights to a return lead L6. The contacts of LT are by-passed with a resistor 37 which is adjusted to such a value that the lights will burn dimly when the relay contacts are open and be restored to normal brightness when the contacts close. Fluorescent lights may be employed for the bright lights if provision is made to keep the heaters or filaments at the ends of the tube hot during idle periods. FIGURE V shows still another circuit responsive to the car door controls, the lower terminal relay, the loading, and the dispatching relays for controlling the car lights. In this arrangement the car door controls, which may include photoelectric controls, operate contacts GA, line 46, and close these contacts when the car is at a landing. The bottom terminal relay closes its contacts BT when the car arrives at the lower terminal. The loading and dispatching relays are arranged to open their contacts CUL and CUD respectively when the car is selected for loading and dispatching. These contacts are arranged in series to energize a motor driven timer T, line 46, as long as the car is standing at the lower terminal with doors open and not selected for loading and dispatching. At the expiration of the unloading time measured by the timer T, it opens its contacts T in line 45 to deenergize the bright car lights. The lights remain off until the circuit in line 46 is broken by selection of the car for loading or closing of the doors.

Various modifications may be made in the circuit without losing the advantage of directing persons to the proper cars while waiting at the terminal floor and without requiring intending passengers to read and observe signs which may be illuminated by the car signal circuits. Thus proper response of the intending passengers is insured by using the natural impulsion of the passengers to select the more brightly lighted interiors in preference of the darkened interiors of the waiting cars.

Having described the invention, I claim:

1. In a passenger elevator system, means for controlling the interior illumination of idle cars waiting at a terminal floor, comprising, in combination, an elevator car, a source of illumination for the elevator car, means for signaling the presence of the car at a terminal, a timer that is energized by said means and that has contacts arranged to energize the illumination means when the car is not at the terminal and for a predetermined time after the arrival of the car at the terminal, dispatcher selection means for selecting the next car to leave the terminal, dispatching means for dispatching the selected car, and contacts on the selection and dispatching means arranged to energize the illumination source, whereby the illumination source is energized during unloading, loading and traveling times of the elevator car and deenergized during idle standing times.

2. In a passenger elevator system, in combination, an elevator car, a terminal relay means that are energized as the car stops at a terminal floor, means for illuminating the interior of the car, timer control means for the illuminating means, car selection and dispatching means, said timer control means being responsive to operation of contacts of the car selection and dispatching means and of the terminal relay means whereby the illuminating means is energized during for a brief interval after the stopping of the car, for the entire interval the car is selected for dispatching and for the entire interval it is in operation between terminals.

3. In a passenger elevator system, in combination, an elevator car, lighting means for the car, a timer for controlling the lighting means, and a series circuit for controlling the timer, said circuit including a set of contacts that are closed when the car doors are open, a terminal car relay having a set of contacts in said circuit that are closed when the car is standing at a terminal, a set of contacts of dispatcher selecting and dispatching relay in said circuit that are opened when the car is selected for dispatching.

4. A system according to claim 3 in which the timer is a flux decay relay and the contacts operated by the car doors, the dispatching and selection relays, and the termi-
7. An elevator system comprising a car, a closure for the car, means to illuminate the interior of the car to a first level, second means to reduce the level of illumination of the car interior substantially below said first level while at a given landing with said closure in an open position, means to sense a transfer of load between said car and landing, and means to raise the level of illumination when said sensing means is operated in response to a transfer of load between said car and said landing.

8. In an automatic passenger elevator system, means for controlling the interior illumination of cars automatically in response to the operating conditions imposed on the car, comprising, in combination, an elevator car, a source of illumination located within the elevator car, means for signaling the presence of the car at a terminal floor, means to energize the illumination source in response to the absence of the car from a terminal floor, means responsive to said signaling means indicating the presence of the car at a terminal floor for defining an interval following arrival of the car at the terminal floor for energizing the illumination source, means responsive to said signaling means for deenergizing said illumination source in response to the presence of the car at the terminal floor upon termination of said interval, dispatcher selection means for selecting the next car to leave the terminal, dispatching means for dispatching the selected car, and means responsive to the selection means for energizing the illumination source, whereby the illumination source is energized during unloading, loading and traveling times of the elevator car and deenergized during idle standing times.

9. In an automatic passenger elevator system having a plurality of cars, serving a dispatching terminal floor and additional floors, means for influencing the entry of intending passengers into the car conditioned as the next to leave the terminal floor comprising, illuminating means within each of said cars, controls for said illuminating means to alter the level of illumination, means automatically responsive to the displacement of an elevator car from the terminal floor for actuating said control to provide a high level of illumination by said illuminating means for said car, means automatically responsive to the arrival of a car at the terminal floor for actuating said control to maintain a high level of illumination by said illuminating means for said car for an interval following arrival of said car, means to select automatically a car at said terminal floor for loading and for dispatching from said terminal floor, said control means being responsive to said car selection means while a car is selected to establish a high level of illumination by said illuminating means for said car, and means automatically responsive to the termination of said interval following arrival of a car at said terminal floor and the absence of said car means to select means to actuate said control to reduce the level of illumination provided by said illumination means for said car to a level substantially below said high level, whereby a car interior is illuminated at a high level while displaced from said terminal floor, while unloading, and while selected for loading and for dispatching, and is illuminated at a low level during idle standing time at said terminal floor.

10. In an automatic passenger elevator system having a plurality of cars serving a dispatching terminal floor and additional floors, means for influencing the entry of intending passengers into the car conditioned as the next to leave the terminal floor comprising, illuminating means within each of said cars, controls for said illuminating means to alter the level of illumination, means automatically responsive to the displacement of an elevator car from the terminal floor for actuating said control to provide a high level of illumination by said illuminating means for said car, means to select automatically a car at said terminal floor for loading and for dispatching from said terminal floor, said control means being responsive to said car selection means while a car is selected to establish a high level of illumination by said illuminating means for said car, and means automatically responsive to the presence of a car at said terminal floor and the absence of the selection of said car by said selecting means to actuate said control to reduce the level of illumination provided by said illumination means for said car to a level substantially below said high level, whereby a car interior is illuminated at a high level while displaced from said terminal floor, and while selected for loading and for dispatching, and is illuminated at a low level during idle standing time at said terminal floor.

References Cited in the file of this patent

UNITED STATES PATENTS

2,722,672 Suozzo ------------ Nov. 1, 1955