This invention relates to a selector for elevators to signify the position of the elevator at any time with respect to its landings, whereby stops may be made at landings where calls exist, such calls may be cancelled, the position of the elevator indicated to waiting passengers, and other functions may be performed.

Therefore such selection has generally been achieved by a selector machine, driven by a mechanical connection to the elevator car, and reproducing the position of the elevator by motion of a small scale carriage, which travels in correspondence with the elevator and operates switches as may be required. In other types of previous selectors the necessity for a machine has been avoided by causing the elevator to act as its own selector, by mounting a multiplicity of switches in the hoistway so as to be actuated by the passing car, and, in addition, mounting certain switches on the car so as to engage cams located at each landing. There have been many disadvantages of such arrangements, as for example the actuation of so many switches is often noisy; they are costly to mount, wire, and maintain by reason of physical location in the hoistway and the relatively great distance between them. Still another type of selector heretofore contemplated is the type that acts by stepped in discrete amounts as the elevator passes points in the hoistway related to the landings, usually through switches carried by the car engaging fixed cams at each landing. Such devices also have disadvantages, as for example they have been complicated, erratic in their action, and have had no means for resetting themselves to conform to the elevator position if displaced by any means.

The present invention is directed towards overcoming the above and other disadvantages in selectors.

One of the objects of the present invention is to provide a selector that is operated by the sequential operation of two car-mounted operating switches co-acting with a fixed cam or vane at each intermediate landing.

A further object is to provide a selector that steps in the proper direction to coincide with that of the elevator, without reference to any elevator operating devices, but only to the sequence of operation of the said selector operating switches.

A further object is to provide a selector that, when out of step, resets itself whenever the elevator reaches either terminal landing.

A further object is to provide a selector that will not step falsely because of power interruption, regardless of the position of the elevator at the time.

A further object is to provide a selector that will step and follow the motion of the elevator correctly, even though the latter is moved by other than the normal operating means.

A further object is to provide a selector that is simply and economically made, installed and operated.

A further object is to provide, in such a selector, a relay circuit that records which of two operating switches was first operated, while both of them are operated.

A further object is to provide in an elevator system a plurality of latch relays one less than the number of landings in the elevator system for signifying the position of the elevator car, a pair of operating switches, means for adjacent said landings for operating said switches in a particular order when the elevator car is moving upward and for operating said switches in the reverse order when the elevator car is moving downward, means operably coupled to said latch relay and including said operating switches for stepping said latch relays in one of two directions depending upon the order in which said switches are operated so that said relays normally signify the position of the elevator car.

A further object is generally to improve the design and construction of selectors for elevators.

The means by which the foregoing and other objects of the present invention are accomplished and the manner of their accomplishment will be readily understood from the following specification taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a fragmentary diagrammatic view of an elevator system employing the selector of the present invention.

FIG. 2 is a schematic circuit diagram of the direction signifying portion of the selector.

FIG. 3 is a schematic circuit diagram of another portion of the selector, which signifies the position of the elevator.

FIG. 4 is a schematic circuit diagram similar to FIG. 3, but using blocking rectifiers instead of relay contacts for certain portions of the circuit.

Referring now to the drawings in which the various parts are indicated by reference characters, a typical elevator installation with which the selector of the present invention is adapted to be used is shown in FIG. 1. In this FIG. it will be seen that an elevator car 11 having a cab with an entrance door 13 is adapted to travel vertically in guides, not shown, in a hoistway 14 and is suspended by hoisting ropes 15 passing over a traction sheave 17 that is supported on an axle 19 which is relatively driven by the usual means, or alternatively, elevator car 11 is supported by a hydraulic plunger 21. The landing levels are indicated by the numerals 1 through 5 with the lower and upper terminal landings being the ones designated 1 and 5, respectively, and the intermediate landings being those designated 2, 3 and 4. At all but landings 1 and 5, vanes 24, formed of iron or the like, are mounted in hoistway 14 to co-act with upper switch SU and lower switch SL mounted on elevator car 11. Switches SU and SL are preferably magnetic, and operate when any of vanes 24 are in close spaced adjacency thereto. Thus, when the elevator car 11 is at a floor, for example, floor 2 as shown in FIG. 1, both switches SU and SL are operated. When the elevator car 11 moves upwardly from the position shown, it will be understood that switch SU will move past the upper end of vane 24 and release first, and with continued movement of the elevator the other switch, i.e., SL, will release when it also moves past the upper end of the vane. Thus, with continued upward movement of the elevator car 11 towards floor 3, the switch SU will be the first to operate and next switch SL. For the purposes of clarity, when the following terms are used, they will be considered to have the following meanings: The term "upper approach zone" means the zone occupied by the floor level of the elevator car 11 wherein switch SL is operated and switch SU is not. Such a zone exists above each intermediate floor. The "slow-down zone" is defined to be that zone in which both switches SU and SL are operated, and this zone extends on both sides of each intermediate landing. The "lower approach zone" is defined to be that zone on the floor level in which only switch SU is operated, and such a zone exists below each intermediate landing level. The three zones so defined are contiguous, so that the car in passing downward enters first.
the upper approach zone, passes through the slow-down zone, and finally passes through the lower approach zone in departing downward from the said landing.

Attached adjacent the lowest landing is a mechanical switch having two contacts TL and BL, normally closed contact BL, and a normally closed contact BL2, which are referred to later. Switch BL is adapted to be operated, when elevator car 11 is in the lowermost position, by a cam 25 fastened to the elevator car. Adjacent the uppermost landing a similar mechanical switch TL, having a normally open contact TL1 and a normally closed contact TL2, which are referred to later, is mounted and arranged also to be actuated upon by cam 25 when the elevator is at the uppermost landing.

It should be pointed out at this point that stopping from full speed by a single point of cut-out is not likely to be accurate enough on any but the slowest of elevators, and that consequently leveling at a substantially slower speed will usually be required. As such leveling is normally under control of separate switches mounted on the car and co-acting with cam or vanes mounted in the hoistway in manners well-known in the art, such leveling is in fact specifically referred to herein, as it is obvious. When a stopping relay or terminal stopping switch is actuated, the elevator car 11 reduces to a slow leveling speed, and final stop thereafter is controlled by leveling switches. When leveling is not employed, this slow-down zone becomes a stopping zone. Thus, when the term "slow-down zone" is used, it is not by way of limitation to a system using leveling but is deemed to mean the stopping zone when leveling is not used.

The control panel associated with elevator car 11 is generally indicated at 27 and the selector 28 of the present invention forms a part thereof. A common terminal strip 29 provides means for the connection of various operating devices, to the power source, etc.

Selector 28 consists of two principal parts: (1) A direction signifying device or relay circuit 31, which is shown in FIG. 2, and (2) an elevator position signifying device or latch relay circuit 35, shown in its preferred embodiment in FIG. 3 and alternately in FIG. 6.

Referring first to direction signifying device 31, this device includes three relays ZB, AL, and ZA, whose coils are indicated by the circles in FIG. 2 with the above mentioned letters therein, and whose contacts are indicated by the letters and a numeral suffixed to the contact. Contact ZB contains two contacts in this figure, ZB1 and ZB2, and relay ZA is shown with two contacts, ZA1 and ZA2. A third contact of ZA and ZB is shown in FIG. 3 and will be referred to later. Also, the two contacts of relay AL are shown in FIGS. 3 and 6 and will also be referred to later. At this point it should be pointed out that for purposes of clarity a convention is employed in FIG. 2 and in the other figures to indicate the status of relay and switch contacts. This convention is as follows: A pair of opposed transverse lines drawn across a gap in a line representing a conductor represents a normally open contact in normal conditions (for example, as shown by the contact ZA2 in FIG. 2). A short diagonal line bridging the gap indicates the contact is closed by operation of the relay or switch (as for example, the contact ZB1 in FIG. 2). Similar lines with a diagonal line drawn through the transverse lines represent a normally closed contact in normal conditions (as shown by contact ZA1 in FIG. 2), and the same with the part of the diagonal between the transverse lines omitted represents a normally closed contact open by reason of operation of the device of which it forms a part (as shown by contact ZB2 in FIG. 2). It will be noted in FIG. 2 that between the supply lines 35, 37, which receive their sources from an external power supply, one part of the circuit includes ZA in series with contacts ZB2 and SL, another part of the circuit includes ZB in series with contacts ZA1 and SU, and a third part of the circuit includes AL in a circuit which leads from supply line 37 through AL and then branched to the above two portions of the circuit with ZA2 and ZB1 respectively being interposed in the branches. When the relay ZA is operated, it indicates that the elevator car 11 is in an upper approach zone, whereas the slow-down zone having entered from the upper approach zone; the operation of relay ZB indicates that the elevator car is in a lower approach zone or is in the slow-down zone, having entered from the lower approach zone; and the operation of relay AL indicates that the car is in a slow-down zone of a loading. These relays ZB, AL, and ZA, will be unoperated when operated from the switches SU and SL, and it will be understood that relay ZA will operate when the switch SL is closed upon entry of elevator car 11 into any upper approach zone from above. This portion of the circuit may be traced from supply lead 35 through lead 39, switch SL closed, lead 41, normally closed contact ZB2, coil of relay ZA, and lead 44 to supply lead 37. The operation of relay ZA opens contact ZA1 and thus prevents the operation of relay ZB, and closes contact ZA2 to prepare a path for the energizing of relay AL, which will occur when the switch SU is closed upon entry of the elevator car in the slow-down zone. This portion of the circuit may be traced from supply lead 35, through lead 47, switch SU closed, lead 49, switch ZA2 closed, lead 51, coil of relay AL, lead 53 to supply lead 37. Thus, when the elevator car 11 is at a landing or in the slow-down zone of a landing and the relays ZA and AL are operated, it signifies that the elevator car 11 is in a slow-down zone of a lower approach zone. As the elevator travels downwardly from a particular landing, it will be understood that switch SL will first be released which will release relays ZA and AL, which in turn will cause contact ZA1 to close and operate relay ZB. This portion of the circuit may be traced from supply lead 35, through lead 47, switch SU closed, lead 49, normally closed switch ZA1, lead 55, coil of relay ZB, lead 57 to supply lead 37. Then, continued downward movement of elevator car 11 will cause switch SU to release, which will release relay ZB, thereby releasing all of the relays when the switches SU and SL are not opposite a vane 24.

When the elevator car 11 approaches a landing from below, as the elevator car enters the lower approach zone thereof, it will be understood that switch SU will close which will operate relay ZB. This portion of the circuit may be traced from supply lead 35, through lead 47, switch SU closed, lead 49, contact ZA1, lead 55, coil of relay ZB, lead 57 to supply lead 37. Continued movement upward of the elevator car 11 will cause closure of switch SL which in turn will cause relay AL to close. This portion of the circuit may be traced from lead 35, lead 39, switch SL, lead 41, contact ZB3, lead 51, coil of relay AL, lead 53, to supply lead 37. Thus, when the elevator car 11 is at a landing or in the slow-down zone of a landing and the relays ZB and AL are operated, it signifies that the elevator car has entered the slow-down zone from the lower approach zone. This is the condition of the switches shown in FIG. 2, which indicates the position of the car 11 in FIG. 1 which has arrived at landing 2 from below. As elevator car 11 travels upwardly from the landing, it will be understood that switch SU will first be released which will release relays ZB and AL, which in turn will cause contact ZB2 to close and operate relay ZA. Then, continued upward movement of elevator car 11 will cause switch SL to release, which will release relay ZA.

Thus, it will be seen from the foregoing that when none of the relays ZB, AL or ZA are operated that the car 11 is in an intermediate position between floors and not opposite any vane 24, when ZA is operated alone that the elevator car 11 is in an upper approach zone, when ZB is operated alone that the elevator car 11 is in a slow-down zone of a loading. When ZA and AL are operated that the elevator car 11 is in a slow-down zone having entered from the upper approach zone, and when ZB and AL are operated that the elevator car 11 is in a slow-down zone having entered
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from the lower approach zone. This direction signifying device 31 which has just been described actuates the elevator position signifying device 33, which actuation will be better understood after the following description of the elevator position signifying device.

Referring now to the elevator position signifying device 33 as shown in FIG. 5, the position signifying device comprises a group of latching relays, one fewer than the number of landings served. This number presupposes that hoistway-mounted switches will be provided for each terminal landing, as is general practice in elevator design, and that these switches will perform all selector functions at the terminal landings. Said latch relays are numbered with two consecutive digits, as 12, 23, 34, and 45, respectively, indicating that they correspond respectively to the intervals between first and second, second and third, etc. landings. When ele- vator car 11 is between landings, some one latch relay, corresponding to the number of landings next below and above, will be operated. When at or in the slow-down zone of an intermediate landing, two latch relays will be operated, corresponding to the intervals above and below so that the common numeral in the two relay designations is then the number of the landing at which the elevator is located. In other words, the main relays are in groups of pairs with each pair corresponding to a particular landing. Thus, there are the following three groups of relays: 12 and 23; 23 and 34; and 34 and 45, respectively corresponding to landings 2, 3 and 4.

Each of said latch relays is, in effect, two relays, a main relay which is simply designated by the two consecutive digits above described and a releasing relay which is indicated by the suffix "R." The two parts of each latch relay, i.e. the main relay and the releasing relay, are each provided with a mechanical interlock, indicated diagrammatically in FIG. 3 by the dotted lines, to hold either half relay operated when the other half is released, though not preventing simultaneous operation of both halves. In each of said latch relays, one of the parts thereof, i.e. either its main relay or its releasing relay, must always be operated, and this one is, of course, the last one operated. This type of relay is well-known in the art and it is not deemed necessary to show the details thereof. The coils of these relays are indicated by the circles in FIG. 3 with the above mentioned reference characters therein. Said main relays are provided with a plurality of contacts which are designated using lettered suffixes. For example, the contacts of main relay 12 are 12a, 12b, and 12c. Each of the releasing relays is provided with a contact which is designated by the suffix "R."

In general the direction signifying device 31 actuates elevator position signifying device 33 to step main relays 12, 23, etc. so that as elevator car 11 moves into a slow-down zone of a particular landing the one of the group of relays corresponding to that particular landing towards which the elevator is moving is latched and so forth as the elevator car moves out of said particular slow-down zone towards the one of the main relays of said one of said group of relays which corresponds to the interval behind the one in which the elevator is moving. In other words, assuming that the elevator is at landing 2 as shown in FIG. 1, with main relay 12 12a and 23 latched, as the elevator car moves upward out of the slow-down zone of landing 2 (i.e. when switch SL is released) main relay 12 is released and when the elevator car enters the slow-down zone of landing 3 main relay 34 is operated. As the elevator car 11 travels upward, the main relay of the next lower landing (that is, the one of the group of relays which corresponds to the interval behind the one in which the elevator is moving) is released and the next main relay which corresponds to the interval ahead of the one in which the elevator is moving is operated. Stated another way as the elevator car 11 travels upward the device 31 causes the device 33 to "step" upwardly, releasing the next lower relay or the one behind and "picking

up" the next above or the one ahead. When the elevator car 11 travels downwardly, the reverse of the above mentioned operation takes place. In other words, the device 33 is stepped downwardly to pick up the next lower main relay and release the one above. It will be understood that at least one main relay is operated at all times, and in both the travel of the elevator upwardly and downwardly the position of the elevator car 11 is signified by the main relay or relays which are operated.

In the circuit shown in FIG. 5, it will be seen that for each latch relay there are a pair of alternative series circuits between supply leads 35, 37 with one of these circuits including contact Z3A and the other including Z3B and each circuit is completed through either the main relay or the releasing relay, depending upon whether the contact AL1 or the contact AL2 is closed.

Turning now to a more detailed description of the operation of the device 33, it is assumed that the elevator car 11 is in the position shown in FIG. 1 and the relays and contacts are thus in the position shown in FIG. 2 and FIG. 3. As it will be seen, switches SU and SL are both operated and relays AL1 and Z3B both operated. Upon upward movement of the elevator car 11, switch SU is released which will cause relay AL to be released and ZA to be operated, as heretofore described. A circuit may be traced from supply lead 35, contact Z3A, lead 59, normally closed contact 45c, lead 61, normally closed contact 34d, contact 34c closed, lead 63, normally closed contact T3S, contact 12c closed, coil of releasing relay 12R, lead 65, normally closed contact AL2, to supply lead 37. This causes releasing relay 12R to operate to release relay 12 and break the circuit just described. The releasing of main relay 12 latches relay 12R.

As the elevator car 11 continues to move upward, switch SL opens which releases relay ZA, as heretofore described. On approaching landing 3, when the elevator car enters the approach zone thereof (i.e., when switch SU closes) relay ZB operates but no change takes place in the circuit of FIG. 3. However, when the elevator car enters the slow-down zone (when switch SL closes) relay AL operates to close a path as follows: supply lead 35, contact Z3B closed, lead 65, normally closed contact 12a, lead 67, contact 23b, closed, lead 69, contact 34c closed, coil of main relay 34, lead 71, AL1 contact closed, to supply lead 37. This causes main relay 34 to operate thereby causing releasing relay 34R to release which breaks the circuit just described. The releasing of relay 34R latches main relay 34. If the elevator car 11 is to stop at this floor, operation of main relays 23 and 34 will complete the necessary conditions to bring about the stop. If not, or when running is resumed, departure upward breaks the switch SU first, releasing relays ZB and AL and operating relay ZA in a manner heretofore described. The following circuit may then be traced from supply lead 35, contact Z3A closed, lead 59, normally closed contact 45c, contact 34c closed, contact TB4 closed, contact 23c closed, to the coil of releasing relay 23R, lead 65, normally closed contact AL2, to supply lead 37. This causes relay 23R to operate which opens contact 23c to open all relay 23 contacts breaking the circuit. The release of main relay 23 latches relay 23R. As the car 11 continues to travel upward, switch SL opens and consequently relay 2A releases.

As elevator car 11 approaches landing 4, switch SU causes relay ZB to operate without immediate effect, then switch SL causes relay AL to operate and a circuit is established from lead 35, contact Z3B closed, lead 65, normally closed contact 12a, lead 67, normally closed contact 23a, lead 71, contact 34a closed, lead 73, normally closed contact T3S, lead 75, contact 45c closed, coil of relay 45, lead 71, contact AL1 closed, to supply lead 37. This causes main relay 45 to operate thereby causing releasing relay 45R to release which breaks the circuit just described. The release of relay 45R latches main relay 45.
Upward departure from landing 4 opens switch SU, releasing relays ZB and AL and operating relay ZA. The circuit may then be traced from supply lead 35 through contact ZA3 closed, lead 59, contact 456 closed, lead 69, contact 469 closed, lead 77, contact 348 closed, coil of releasing relay 34R, lead 65, normally closed contact AL2, to supply lead 37. This energizes releasing relay 34R to break the circuit just described. The release of relay 34 latches relay 34R. Then upon continued upward movement, the opening of switch SL releases relay ZA.

Elevator car 11 as it approaches the top landing closes hoistway switch TL1, initiating the stop and energizing the coil of relay TS which forms a part of a mechanism to clear landing calls and to perform other desired functions.

Downward motion of elevator car 11 reverses the sequence heretofore described, and it is readily seen that arrival at the slow-down zone of landing 4 operates main relay 34, departing downward from the slow-down zone releases main relay 45, arrival at the slow-down zone of the third floor operates main relay 23, departure from the slow-down zone releases main relay 34, arrival at the slow-down zone of the second floor operates main relay 12, departure from the slow-down zone releases main relay 23, and arrival at landing 1 closes switch BL1 stopping the elevator car 11 and energizing relay coil BS which forms a part of a mechanism to clear landing calls and to perform other desired functions.

Selector 28 of the present invention may be connected to the other circuits of the elevator controller in many ways. For example, in FIG. 4 is shown one way in which direction selection may be effected. In this figure UP and DP are up and down motion relays, respectively, which are interlocking electrically so that no more than one may be operated electrically. The coils of these relays are indicated by the circles in this figure with the above mentioned letters therein. Normally closed contacts belonging to the various main relays of selector 28 (i.e., contacts 12d, 23e, 34c, and 45d) are connected in series between leads 79 and 81, and contacts C1 through C5 located on call registering relays of usual construction, not shown, connect to this series. Since at least one main latch relay is always operated, a circuit can never tie lead 79 directly to lead 81. The first call from a C relay (unless both adjacent latch relays are operated) will lead to the coil of one of the direction relays, UP or DP, and operate it. It will remain operated until the elevator car 11 has reached the farthest call in that direction, allowing the reverse direction to be established if required.

A circuit for stopping and position indication is shown in FIG. 5, wherein the coils of relays S2, S3 and S4 are indicated by the circles in this figure with these reference characters therein. Relays S2, S3 and S4 are operated selectively by closure of the latch relay contacts of one of the groups of latch relays heretofore mentioned, so that each indicates the presence of the elevator car 11 in the slow-down zone of the corresponding numbered floor. Stopping relay operation, etc. are performed by well-known methods in conjunction with these relays. The circuit in FIG. 5 is shown with relay S2 operated by closure of contacts 12e and 23f, signifying that the elevator 11 is in the slow-down zone of landing 2.

It should be observed that in various cases the indications of the selector 28 may not agree with the physical location of the elevator car 11 in the hoistway 14. For example, a hydraulic elevator might be lowered by manual control with all electrical power disconnected, or the latch relays might be operated manually. In such case, it is desirable to provide automatic means for restoring correspondence at the earliest moment. The portions of the circuit shown in FIG. 3 which include the relays BS, TS and TB will accomplish this restoration whenever the elevator car 11 travels to either terminal landing. It will be seen in this circuit that the normally open contact TS1, when TS is energized, will operate the highest numbered latch relay, i.e., relay 45, and closure of normally open contact TS4 will operate the lowest numbered releasing relay, i.e., relay 12. Closure of contact BL1 by the elevator car 11 being at the lowest floor causes relay BS to operate which in turn will operate the lowest numbered main relay, i.e., relay 12, by closure of contact BS3 and will operate the highest numbered releasing relay 45R by closure of contact BS2. The above described operation of the main and releasing relays will take place if these are not already in the proper position. Closure of either contact TS5 or BS5 by operation of relay TS or BS, as above described, will cause operation of relay TB, and the contacts of relay TB operate the releasing relays of each intermediate latch relay if not already released. These contacts are TB3 and TB5 of releasing relays 34R and 23R, respectively. Normally closed contacts on each relay interrupt parts of the circuit not desired to operate at such times. These relays are TS5, BS5, TS2, TB4, BS4, and TS3. The contact TS1 of relay TB also parallels the normally open contact BS2, so that if BS2 is closed even though relay AL cannot normally operate when the elevator car 11 is at either terminal landing.

It is important that false steps of the selector not occur when power is interrupted and again restored. When the elevator is between landings it is evident that there are no current paths in the selector, and that all operated relays are mechanically held so as not to be influenced by the presence or absence of power. When the elevator is in an approach zone, relay ZA or ZB of FIG. 2 will release and re-operate, but it may readily be established that no action ensues. When the elevator is at a landing, re-establishment of power will energize relays ZA and ZB simultaneously. It is advantageous for one of these to be so made as to be slower than the other in operation, so that one will always be first to operate and lock the other out. A path is then at once available for AL to operate. If AL is slow to operate, the first of ZA or ZB will tend to release one operated selector relay but the operation of AL will at once restore it.

FIG. 6 illustrates an alternate method of resetting the latch relays when out of position, using blocking rectifiers instead of relay contacts to make the resetting connections. This method is preferable when direct current is used, for in this circuit leads 83 and 85 are supplied from the positive supply line 35. Lead 83 supplies the uppermost main relay 45 and the lowermost releasing relay 12R. Lead 85 supplies the lowermost main relay 12 and the uppermost releasing relay 45R. Leads 83 and 85 supply lead 87 through paralleling blocking rectifiers, with lead 87 being energized when the elevator car 11 is at either terminal landing. From this lead 87 relay TB is energized. The contact TB1 of this relay TB parallels the normally open relay contact AL1, as described relative to FIG. 3 and for the same reason. Common lead 87 also supplies each of the releasing relays except the topmost and the lowermost. Blocking rectifiers inserted in each of these operating leads, as well as in the normal operating paths of the main and releasing relays, prevent inadvertent paralleling of circuits which must be kept isolated, as is well-known in the art.

From the foregoing description it will be understood that the present invention provides a simple and effective selector which has means for signifying the direction of motion of the elevator based on the order in which a pair of operating switches are closed and which has means that is actuated by the first mentioned means above for signifying the position of the elevator car and which is stopped in the proper direction by said first mentioned means.

Although the invention has been described in some detail by way of illustration and example for purposes of
clarity or understanding, it is to be understood that it is not to be so limited since changes and modifications may be made therein which are within the full intended scope of this invention as hereinafter claimed.

1. In an elevator system having a hoistway, a pair of terminal landings and a plurality of intermediate landings adjacent said hoistway; a slow-down zone, an upper approach zone, and a lower approach zone respectively adjacent, above and below each of said intermediate landings; an elevator car, and means mounting said elevator car in said hoistway for movement to various positions to serve said landings; a selector for signifying the position of said elevator car relative to said landings comprising a plurality of latch relays one less in number than the number of said landings; each of said latch relays including a main relay half, a releasing relay half, and interlock means for holding one of said halves latched when the other of said halves is released without preventing simultaneous operation of both halves, said main relay halves respectively corresponding to the intervals between adjacent landings, said main relays being grouped in pairs to correspond to said landings so that each group represents a particular landing; circuit means for operating said latch relays so that when only one of said main relays is latched the particular main relay latched normally signifies that said elevator car is in the interval between a pair of said landings to which said main relay corresponds and so that when one of said groups of main relays is latched that particular group latched normally signifies that said elevator car is in the slow-down zone of a landing to which said group corresponds, and elevator car direction signifying means independent of said movement means and operably coupled to said latch relays for stepping said main relays to correspond to the movement of said elevator car.

2. In an elevator system having a hoistway, a pair of terminal landings and a plurality of intermediate landings adjacent said hoistway, a slow-down zone adjacent each of said intermediate landings, an elevator car, and means mounting said elevator car in said hoistway for movement to various positions to serve said landings; a selector for signifying the position of said elevator car relative to said landings comprising a plurality of latch relays one less in number than the number of said landings; each of said latch relays including a main relay half, a releasing relay half, and interlock means for holding one of said halves latched when the other of said halves is released without preventing simultaneous operation of both halves; said main relay halves respectively corresponding to the intervals between adjacent landings, said main relays being grouped in pairs to correspond to said landings so that each group represents a particular landing; circuit means for operating said latch relays so that when only one of said main relays is latched the particular main relay latched normally signifies that said elevator car is in the interval between a pair of said landings to which said main relay corresponds and so that when one of said groups of main relays is latched that particular group latched normally signifies that said elevator car is in the slow-down zone of a landing to which said group corresponds, and elevator car direction signifying means independent of said movement means and operably coupled to said latch relays for stepping said main relays to correspond to the movement of said elevator car.

3. The structure according to claim 1 in which said direction signifying means comprises a first relay, a second relay, and a third relay; circuit means for said first, second and third relay including means for preventing concurrent operation of said first and third relays, means for operating said first relay when said elevator car enters an upper approach zone of any of said landings, means for operating said second relay with said first relay when said elevator car enters a slow-down zone from an upper approach zone whereby concurrent operation of said first and second relays signifies that said elevator car is in a slow-down zone having entered from an upper approach zone, and means for operating said third relay and releasing said first and second relays when said elevator car leaves a slow-down zone going down; means responsive to operation of said first and second relays to cause latching of the one of said main relays corresponding to the interval next below the landing which said elevator car is adjacent; and means responsive to operation of said third relay and release of said first and second relays to cause releasing of the one of said main relays corresponding to the interval next above the landing — from which said elevator car has just departed, whereby as said elevator car moves from landing to landing in its downward movement the main relays are stepped in sequence to latch the next lower one and release the one above.

4. The structure according to claim 1 in which said direction signifying means comprises a first relay, a second relay, and a third relay; circuit means for said first, second and third relays comprising means for preventing concurrent operation of said first and third relays; means for operating said third relay when said elevator car enters a lower approach zone of any one of said landings; means for operating said second relay with said third relay when said elevator car enters a slow-down zone from a lower approach zone whereby concurrent operation of said second and third relays signifies that said elevator car is in a slow-down zone having entered from a lower approach zone, and means for operating said first relay and releasing said second and third relays when said elevator car leaves a slow-down zone going up; means responsive to operation of said second and third relays to cause latching of the one of said main relays corresponding to the interval next above the landing which said elevator car is adjacent; and means responsive to operation of said first relay and release of said second and third relays to cause releasing of the one of said main relays corresponding to the interval next below the landing from which said elevator car has just departed, whereby as said elevator car moves from landing to landing in its upward movement the main relays are stepped in sequence to latch the next higher one and release the one below.

5. The structure according to claim 1 in which said direction signifying means comprises a first relay, a second relay, and a third relay; circuit means for said first, second, and third relays including means for preventing concurrent operation of said first and third relays; and co-acting means comprising a first switch and a second switch interposed in said circuit means and operable in a first sequence responsive to movement of said elevator car in one direction and operable in the reverse sequence responsive to movement of said elevator car in the opposite direction, said circuit means being arranged so that operation of said first and second switches in said first sequence is effective to concurrently operate said first and second relays whereby signifying movement of said elevator car in said one direction and being arranged so that operation of said first and second switches in said reverse sequence is effective to concurrently operate said second and third relays whereby signifying movement of said elevator car in said opposite direction.

6. In an elevator system having a hoistway, a plurality of landings adjacent said hoistway, an elevator car, and means mounting said elevator car in said hoistway for movement to various positions to serve said landings, the combination therewith of co-acting means in said
hoistway and on said elevator car including a first switch and a second switch operable in a first sequence responsive to movement of said elevator car in one direction and operable in the reverse sequence responsive to movement of said elevator car in the opposite direction, and means for signifying the sequence in which said switches have been operated and thereby the direction of movement of said elevator car comprising a first relay, a second relay, and a third relay, and circuit means for said first, second, and third relays including means for preventing concurrent operation of said first and third relays, said first and second switches being interposed in said circuit means, and means whereby operation of said first and second switches in said first sequence is effective to concurrently operate said first and second relays thereby signifying movement of said elevator car in said one direction and operation of said first and second switches in said reverse sequence is effective to concurrently operate said second and third relays thereby signifying movement of said elevator car in said opposite direction.

7. The structure according to claim 1 including correspondence restoring means operably coupled to said releasing relay halves of each latch relay of said intermediate landings for controlling the operation thereof, and means at said terminal landings for operating said correspondence restoring means upon arrival of said elevator car at either of said terminal landings.

8. In an elevator system having a hoistway, a pair of terminal landings and a plurality of intermediate landings adjacent said hoistway, approach zones and a slow-down zone adjacent each of said intermediate landings, an elevator car, and means mounting said elevator car for movement to various positions to serve said landings; the combination threewith of a selector for signifying the position of said elevator car relative to said landings comprising a plurality of latch relays one less in number than the number of said landings; each of said latch relays including a main relay half, a releasing relay half, and interlock means for holding one of said halves latched when the other of said halves is released without preventing simultaneous operation of both halves, said main relay halves respectively corresponding to intervals between adjacent landings said main relays being grouped in pairs to correspond to said landings so that each group represents a particular landing, and circuit means for said latch relays whereby when only one of said main relays is latched the particular main relay latched normally signifies that said elevator car is in the interval between a pair of said landings to which said main relay corresponds and when one of said group of said main relays is latched the particular group latched normally signifies that said elevator car is in the slow-down zone of a landing to which said group corresponds including a pair of alternative series circuit means for operating each of said latch relays, one of said series circuit means including a switch contact responding to movement of said elevator car in one direction relative to an intermediate landing and the other of said series circuit means including a switch contact responding to movement of said elevator car in the opposite direction relative to said intermediate landing, and a pair of contacts in said pair of series circuit means including a normally open contact and a normally closed contact respectively connected to said main relay and said releasing relay halves whereby the operation of a selected one of said pair of contacts determines whether the main relay half or the releasing relay half of a latch relay is operated.

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