Sept. 8, 1925

1,553,204

E. B. THURSTON

ELEVATOR OPERATION DEVICE

Filed Nov. 13, 1922

4 Sheets-Sheet 1

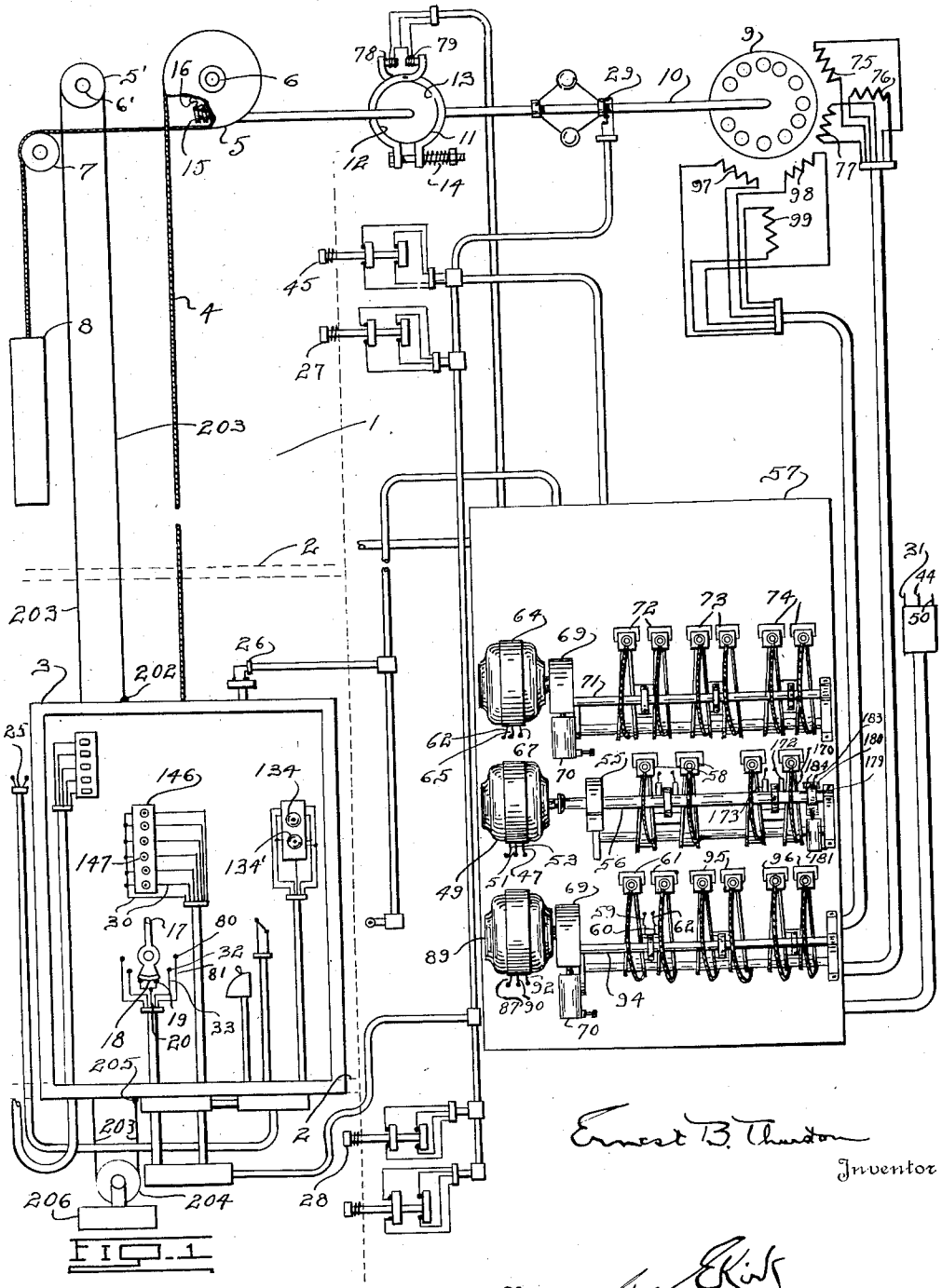

FIG. 1

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ELEVATOR OPERATION DEVICE

Filed Nov. 13, 1922 4 Sheets-Sheet 2

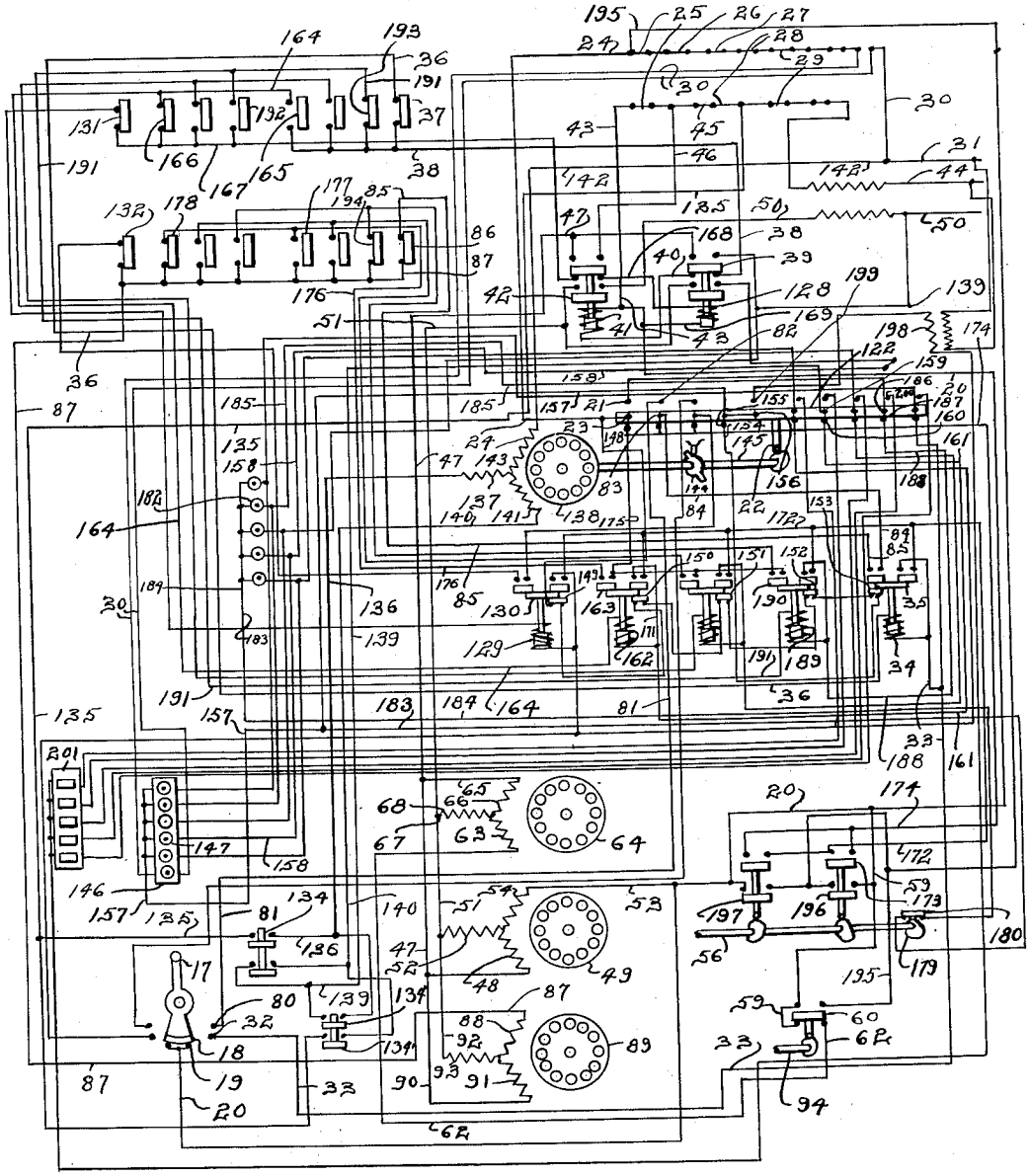

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FIG. 2

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ELEVATOR OPERATION DEVICE

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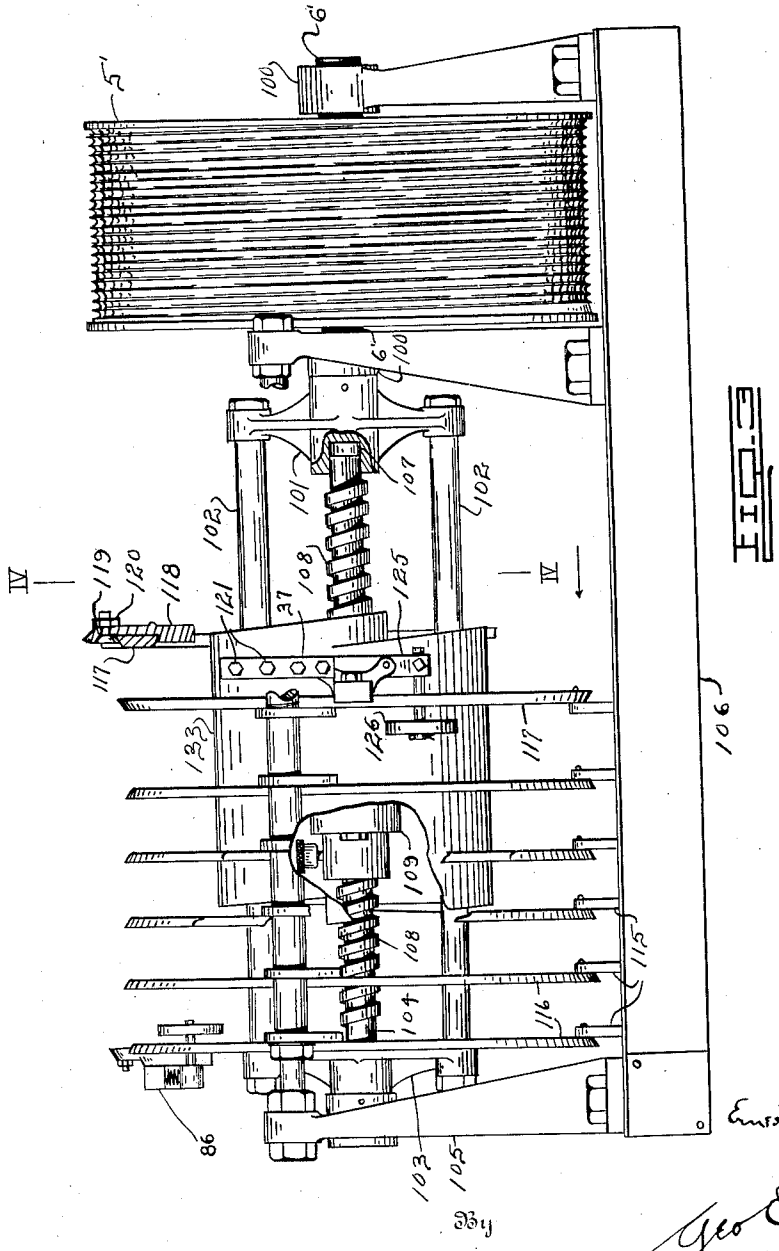

FIG. 3

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ELEVATOR OPERATION DEVICE

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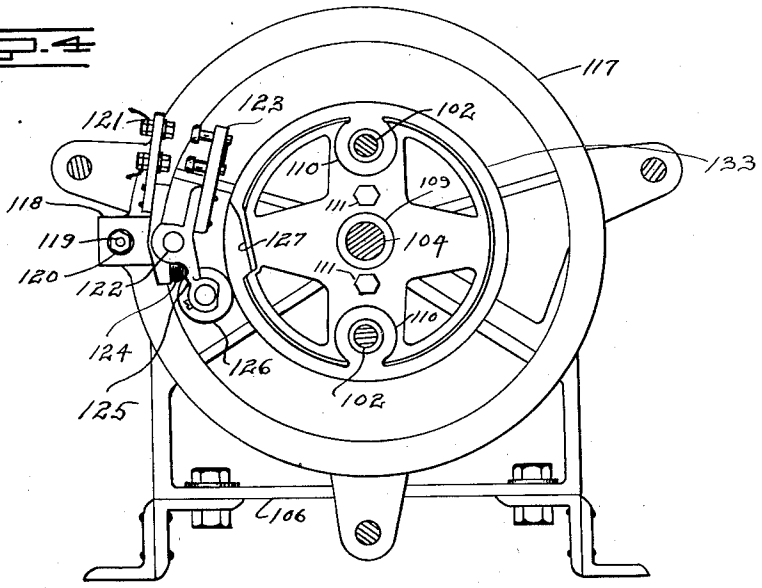
FIG. 4



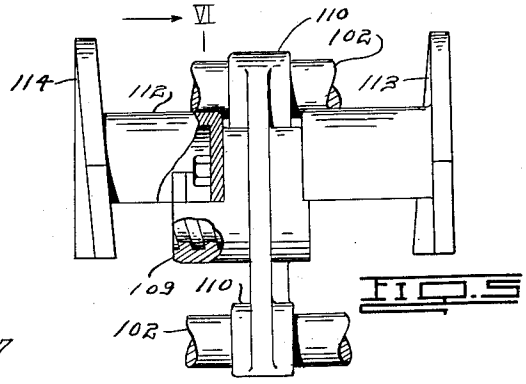


FIG. 5

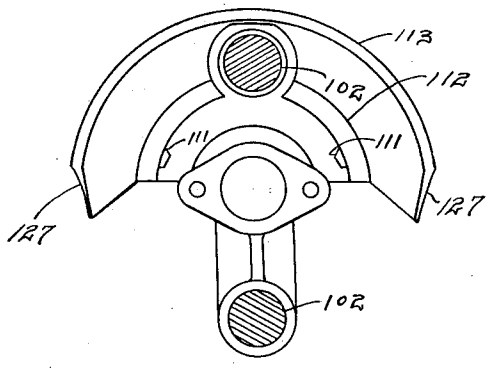


FIG. 6

Ernest B. Thurston Inventor

By Geo. E. Kirk

Attorney

Patented Sept. 8, 1925. 1,553,204

UNITED STATES PATENT OFFICE.

ERNEST B. THURSTON, OF TOLEDO, OHIO, ASSIGNOR TO THE HAUGHTON ELEVATOR & MACHINE CO., OF TOLEDO, OHIO, A CORPORATION OF OHIO.

ELEVATOR-OPERATION DEVICE.

Application filed November 13, 1922. Serial No. 600,542.

REISSUED

To all whom it may concern:

Be it known that I, ERNEST B. THURSTON, a citizen of the United States of America, residing at Toledo, Lucas County, Ohio, have invented new and useful Elevator-Operation Devices, of which the following is a specification.

This invention relates to features of control.

This invention has utility when incorporated in electric control for elevators of manual and automatic or pre-selective landing control type, and with accurate landing registry location and maintenance.

Referring to the drawings:

Fig. 1 is a view, with parts broken away, of a three-phase alternating electric current operated elevator installation hereunder;

Fig 2 is a wiring diagram of features of control of the installation of Fig. 1 independently of the power circuit;

Fig. 3 is a side elevation of the control driving drum, with the control drum associated therewith, parts being broken away;

Fig. 4 is a section on the line IV—IV, Fig. 3.

Fig. 5 is a side elevation, with parts broken away, of a skeleton control drum or cam for automatic floor finding operation of an elevator car in conjunction with operator control in travel toward such floor or landing; and

Fig. 6 is a section on the line VI—VI, Fig. 5.

In elevator shaft 1 are landings 2 past which may travel elevator car 3 as actuated by hoisting line 4 passing upward from the car 3 about hoisting drum 5 on shaft 6. The hoisting line 4, after passing about the hoisting drum 5 extends about idler 7 to counterweight 8. Motor 9 is shown as provided with shaft 10 upon which is fixed brake drum 11, normally engaged by brake shoes 12, 13, held in position thereagainst by spring 14. This held shaft 10 through worm 15 thereon in mesh with worm wheel 16 fixed with the shaft 6 and the drum 5, serves to hold the car 3 in the elevator shaft or well 1 against travel. Upon release of the shaft 10 and driving operation of the drum 5 therefrom, travel of the car 3 is effected.

For manual or operator handling of the car 3, there is provided a controller 17 in the car 3. This controller has contact 18 which in central position engages terminal 19 from which extends line 20 to terminal 21 at throw over switch 22. The position of this switch as taken herein for operator handling of the car 3, when closed is that the terminal 21 has contact with terminal 23. From this terminal 23 extends line 24 past gate switch 25 on the car 3, past landing door interlock switches 26, upper over travel switch 27, lower over travel switch 28, governor switch 29, as a series of safety devices, thence by way of line 30 past car push button normally closed to power supply line 31.

In the handling of the controller 17, say for up direction travel of the car 3 in the elevator well or shaft 1, this controller 17 is shifted to bring its contact 18 to terminal 32. From this terminal 32 extends line 33 by way of coil 34 at switch 35, thence by line 36 past switch 37 to line 38 extending to interlock at down direction relay 39. With such down relay 39 closed, the line 38 is connected to line 40 extending to energize coil 41 of up direction relay 42. From this coil 41 extends line 43 past safety device switches 25, 28, 29, to second power supply line 44. This closing of the up direction relay 42 effects operation of direction and low speed switches.

The power line 44 extends past upper stop limit switch 45, and thence by line 46 to the relay 42, and therefrom by line 47 to winding 48 of direction switch motor 49. Third power supply line 50 extends to the relay 42, and thence by way of line 51 to winding 52 of the switch motor 49. From the line 20, connected through the switch 23, line 24, and devices 25, 26, 27, 28, 29, 30, with the power line 31, is branch 53 to third winding 54 of the motor 49. The three windings of this three phase alternating current torque motor 49 are thus energized, and effective through coupling 55 to rock shaft 56 carried by control board or panel 57. Up direction power switch 58 is accordingly closed through the operation of this shaft 56.

From the line 20 extends branch 59 past interlock 60 as actuated by shaft 94 for high speed switch 61. With this high speed main switch 61 closed, the line 59 is connected by line 62 to winding 63 of main slow speed switch torque motor 64, carried by the panel 57. The line 47 has branch 65 to winding 66 of the torque motor 64, while the line 51 has branch 67 to winding 68. Accordingly, as the relay 42 has closed to

energize the direction motor 49, there is a simultaneous energizing of low speed main switch motor 64, effective through two to one speed reduction gearing 69, and as retarded by dashpot 70, to rotate shaft 71 for first closing main low speed switch 72, to be followed by slow speed acceleration switches 73, 74, cutting out acceleration resistances in slow speed windings 75, 76, 77, of the actuating motor 9 for the hoisting drum 5. As shown these resistances are in a drawn out junction of the Y-type of three phase windings, and one switch arm bridges between two lines to cut out resistances in two phases and the second arm of the two arm switch bridges to cut out the third resistance and connect to the other arm to thereby form the junction in a balanced cutting out of these resistances. The closing of the direction switch 58 serves to energize brake coils 78, 79, thereby moving the brake shoes 12, 13, clear of the brake drum 11, so that the motor 9 is free for rotating the shaft 10, and through the worm 15, and the worm wheel 16, driving the drum 5 for causing the hoisting line 4 to move the car 3 upward in the shaft 1, at slow speed travel rate.

For increasing the upward travel rate of the elevator car 3, the controller 17 is shifted to have the contact 18 engage terminal 80 from which extends line 81 to terminal 82 at the throw over switch 22. As this throw over switch 22 is in position for operator handling of the car 3, the terminal 82 is connected with terminal 83 from which extends line 84 to the switch 35. This switch 35 was energized for closing when the controller 17 was on the terminal 32. Accordingly the line 84 is connected to line 85 past upper floor slow down switch 86, at a control device or drum mechanism near the upper floor stop switch 37. From this switch 86 extends line 87 to winding 88 of high speed switch torque motor 89. From the line 47 extends branch 90 to winding 91, and from the branch 51 extends branch 92 to winding 93. The three windings 88, 91, 93, of the high speed torque motor 89 are now energized. This high speed switch operating motor 89 is mounted on the panel 57 and through speed reduction gearing 69, and as retarded by dashpot 70, may rotate shaft 94 to close high speed switch 61, and simultaneously open the interlock 60, cutting out the low speed switch motor 64, so that the weight at the dashpot 70 may draw the shaft 71 into position for opening the switches 74, 73, 72, thereby deenergizing slow speed windings 75, 76, 77, of the motor 9. Simultaneous with this de-energizing of the slow speed windings of the motor 9, the high speed main switch 61 in closing has been followed by high speed acceleration switches 95, 96, which in sequence first energize the high speed windings 97, 98, 99, and then in steps cut out resistances with maintenance of load balance between the windings, as the resistances are in the brought out junction of the star windings. Each switch is shown as comprising two arms. One arm bridges between two lines to cut out two resistances, and the other arm connects with said bridge to cut out the third resistance to provide the junction. The car 3 is now ascending in the well 1 at high speed.

In the event the operator does not act to throw the controller 17 to a central position for an intermediate landing stop in the well 1, the car 3 is automatically brought to a stop at the top floor or landing 2. To this end landing control stops are connected for control operation from a driving drum 5′. The driving drum 5′ is fixed with a shaft 6′ mounted in bearings 100. Fast on one end of the shaft 6′ as protruding from a bearing 100 is two-armed rotary bracket or spider 101 (Fig. 3) as a driving carrier for rotating guide rods 102. This pair of rods 102 extends to a second bracket or spider 103 loosely mounted on shaft 104 fixed against rotation by mounting in bracket 105 uprising from base 106 carrying the drum bearings 100. This non-rotary shaft 104 extends to be held centered as to the rods 102, by entering socket 107 of the spider 101. Between the spiders 101 and 103, the shaft 104 has threaded portion 108. Mounted on this threaded portion 108 of the non-rotary shaft 104, is nut 109 having arms 110 through which the rods 102 extend. Accordingly as the rods 102 swing about the shaft 104 as driven from the drum shaft 6′, the nut 109 is rotated clockwise for one direction of elevator travel, and counter-clockwise for the reverse direction of elevator travel. This nut 109 accordingly has an angular shifting with the driving drum 5′. The number of pitches of the threaded portion 108 are in excess of the number of rotations the drum 5′ has for the full travel distance for the elevator car 3. The range of travel of the nut 109 is thus within the extent of the threaded portion 108.

For effecting automatic control, the traveling nut 109 may have mounted thereon by bolts 111, a cam carrying control drum. For effecting floor finding in connection with operator control, or for automatic stopping at terminal landings, a skeleton drum 112 may be used. This drum is shown as provided with down switch coacting flange or cam 113 at one end and up switch coacting flange or cam 114 at the other end. The base 106 is provided with upstanding brackets 115 carrying toward the bracket 105, one series of mounting rings 116, and disposed oppositely thereto and extending toward the bearings

100, a second series of mounting rings 117. These rings 116, 117, are coaxial with the shaft 104 and surround the travel region of the rods 102. Mounted on the ring 116 adjacent the bracket 105 are switches 37, 86. A hook plate 118 is adjustably clamped by wedge head bolt 119 as drawn up by nut 120 into firmly anchoring position at such point as may be desired on the ring 116. The line terminals are brought in to arm 121 carried by the plate 118. Pivot pin 122, carried by the plate 118 rockably mounts switch closing arm member 123, which is normally held in closed position by compression helical spring 124, coacting between the plate 118 and arm 125. This lever arm 125 carries roller 126 which, in the closed position of the switch, extends radially inward to be in the range of actuator drum travel. The control cams 113, 114, are shown of an extent approximating 180° and are of the pitch of the threaded portion 108, thereby limiting registry of the roller 126 therewith to a selected pitch arc. The lineal travel rate of the up direction switch controlling cam 114 while not identical with the travel rate of the car 3 as determined by the drum 5', may approximate such travel rate, and as herein shown is positively directly proportional thereto as directly connected up against lost motion disturbances. Adjustable mounting of the switch 86 on the ring 116 may be such that the slow down switch 86 is first opened. This means, that notwithstanding the operator has failed to shift the controller 17 off the terminal 80, the counterweight action of the piston in the dash-pot 70 at the high speed torque motor 89 has automatically opened the switches 96, 95, 61, with resultant automatic cutting in of the slow speed switch torque motor 64 due to the action of the interlock 60. This position for the automatic action of the slow down switch to throw the driving of the car 3 from high speed travel rate to low speed travel rate may occur at such distance short of the top landing 2 as is found most acceptable in practice, depending on the speed of the car, and load. As an instance, this opening of the high speed switch 61 may occur eighteen inches below the top floor 2. The continued travel of the car 3 at slow speed is controlled by the drum 5', and while the roller 126 has ridden up on terminal incline 127 of one end of the cam 114 to open the switch 86, the continued travel of the cam effects lifting of the roller 126 to open the switch 37 as the car 3 reaches the top landing 2, thereby automatically stopping the car in proper registering position with such landing. The ready angular adjustment of the plates 118 on the rings 116, permit simple determination of the proper placing of these automatic switches. The car 3 is thus stopped automatically, notwithstanding the operator has not thrown the controller 17 to central or off position.

To effect movement of the car 3 downward away from the top landing 2, it is only necessary to throw the controller 17 reversely from the throw given for up direction travel, i. e., to the right in Fig. 1, which will be effective through down direction relay coil 128 at the down direction relay 39, and will energize landing or floor terminal selection solenoid 129 for the first or lowermost floor in the well 1, to close switch 130. This series of connections and control is similar to that for the up direction as heretofore described with reference to up direction relay coil 41 and up direction relay 42. The control lines will extend past lower landing 2 stop switch 131, as well as slow down switch 132 for said lowermost landing. The car 3 if not stopped at an intermediate position, will automatically come to a stop at the bottom floor, even with the controller 17 in downward on position. The sequence of this automatic operation is determined by the control drum cam 113 acting first to open the slow down switch 132 and then the stop switch 131. This mode of automatic stopping terminally of the shaft 1 may occur with control drum 133 continuous between the cams 113, 114. As so far described, but a single ring 116 as a mounting for switches to effect upper limit stopping, and a single ring 117 for switches to effect lower limit stopping, are sufficient.

In the automatic or push button control, the continuous drum 133 is in order as well as rings 116 for mounting up switches as to every floor but the lowermost, and rings 117 for down switches for every floor but the uppermost. Conversion of this installation from manual or operator controlled to one of the automatic or push button type is effected simply by the operator in the car 3. Furthermore, reversal or changing back to manual from push button, may as simply take place, likewise from operation of switch 134 in the car 3, while resetting of the switch 22 is had by operating the switch 134'.

From the line 44, between the switches 28, 45, extends line 135 to the switches 134, 134' in the car 3. The line 135 is connected by this switch 134 to line 136 extending to winding 137 of torque motor 138. From the power supply line 50 extends branch 139 past this normally open switch 134 by way of line 140 to winding 141 at the motor 138. From the power supply line 31, there is branch line 142 to winding 143. As the three windings of this torque motor 138 are energized, the motor gives a pull to a stop to turn shaft 145, thereby shifting the throw over switch 22 from the manual or operator

controlled position, to the automatic or push button control. For re-operation the switch 134' brings about a reverse turn for the shaft 145, which would place the switch 22 in the original position for operator operation.

The installation is now considered as the throw over switch thrown for push button control.

Assuming the car 3 is at the third floor landing, then the stop switches for the floors therebelow on the down are closed, and the up stop switches for the floors thereabove are also closed. The remaining or intermediate stop switches, both up and down are held open by the drum 133. Similar conditions for open and closed slow down switches prevail at this same position of the car 3.

The passenger in the car 3 may, after the doors or gates are closed, select a floor, as floor second—the one below that at which the car is assumed to be. To this end, in the bank of push buttons in panel 146 in the car 3, push button 147 is depressed. The circuits for the push button are now to be traced.

The power supply line 31, in normal operation, is connected through the several safety devices and line 24, from which extends branch 148, past normally closed interlocks 149, 150, 151, 152, 153, one at each relay for each floor or landing stop, from the switch 35 as the top landing relay to and including the switch 130 as the bottom landing relay switch. From the interlock 153 extends line 154 to terminal 155 at the throw over switch 22. This terminal 155 is closed with terminal 156, from which extends line 157 to the push button 147 which has just been depressed. As this push button 147 is depressed, the line 157 is connected by way of line 158 to terminal 159 which at this position of the throw over switch 22 is closed with terminal 160, having line 161 extending to coil 162 at second floor relay switch 163. From this relay coil 162, line 164 extends to stop up switch 165, which is open. However, this line 164 also extends to down stop switch 166, which as heretofore discussed, is a stop switch below the car 3 and is closed. Therefore, there is connection from the line 164, past this switch 166 to line 167 through the closed interlock of open up direction switch 42, thence by line 168 to down direction relay coil 128, connected by the line 169 with the line 43 through the safety devices to the power supply line 44.

It is to be noted that energizing of the landing relay coil 162, closes this switch 163 and opens the interlock 150. The throwing of the down direction relay 39 effects operating the direction switch torque motor 49 for closing down direction switch 170. As the switch 163 is thrown to closed position and thus cuts out or opens the interlock 150, there is by-pass by line 171 for maintaining the coil 162 energized. This line 171 is connected by the closed switch 163 and line 172 to interlock 173 as closed by the down direction switch 170, and thence by line 174 to the throw over switch 22, where it is there connected to the line 24. Even though the button 147 be depressed for but a short interval, there results this automatic by-passing not only of the interlock 150, but also of the push button 147, with the operation not only of the direction switch torque motor 49, but also of the high speed main switch 61, with its acceleration resistance cutting out switches 95, 96, to closed position by the motor 89. The relay 162 effects this starting of the car 3 downward on high speed, for the line 24 at the throw over switch 22, is connected with line 175 to the relay switch 163, and past this closed switch by way of line 176 with no effect at open slow down switch 177, but effective past closed slow down switch 178 and the line 87 to complete the third line to the motor 89—the lines 90 and 92 having been connected in by the down direction relay 39. This approximately simultaneous action of the high speed main switch motor with the direction switch motor, opens the interlock 60 to preclude any operation whatsoever of the slow speed switch torque motor 64.

The car 3 is now traveling downward at high speed from the third landing toward the second. As the car 3 reaches, say about 18 inches of the second landing 2, the roller 126 of the switch 178 rides up the terminal incline 127 of the down direction cam end 113 of the drum 133, to open the slow down switch 178, thus automatically cutting out the high speed switch motor 89, for opening the high speed windings switches, and simultaneously through the interlock 60 completing the circuits for energizing the slow speed switch torque motor 64, thereby actuating the car 3 toward the second landing at slow speed. As this landing is reached, the roller 126 at the switch 166 rides up the terminal incline 127 of the down direction cam end 113 of the control drum 133 and opens the stop switch 166 as the car 3 registers with such landing. The passenger in leaving the car 3, opens the landing doors or car gates, and through the safety devices, thereby holds the car 3 against anyone at another landing taking such car.

At the direction switch shaft 56 there is cam 179 which in switch closing rotation of the shaft 56 for either direction, effects opening of normally closed switch 180 in the line 183. This switch is retarded in closing by dashpot 181, thereby providing a time lag against one at a landing taking the car from a passenger, if the passenger acts promptly for opening the car door at once the car 3 reaches the landing to which the car has traveled. Opening of the car door, through

the safety device circuit precludes any landing or even pushbutton on the car control for operating the car. Should the passenger be slow in opening the car door, someone at another landing may push a landing button and effect starting of the car 3 away from the landing to which it has taken the passenger.

The landing push button control may be considered, say as for taking the car from the second floor to the fourth floor. The one desiring passage in the elevator pushes button 182 at the fourth floor. From the terminal 156 at the throw over switch 22, and the line 157 extends line 183 past the closed time lag interlock or switch 180 at the direction switch torque motor shaft 56, thence by line 184 to the switch or push button 182 at the fourth landing. From this push button 182, this line 184 is connected to line 185 extending to terminal 186, which in this push button control position of the throw over switch 22 is connected with terminal 187 from which extends line 188 to coil 189 at fourth floor landing relay switch 190. From this coil 189 extends line 191 which cannot get past open stop switch 192 but can get past closed stop switch 193 to the line 38 past the down direction relay switch 39 closed interlock and the line 40 to energize the coil 41 in throwing the up direction switch 42, the line 43 being from the coil 41 past the safety devices for completing the circuit. The direction switch torque motor 49 is operated to close the up direction switch 58, and as before described, the high speed motor 89 is simultaneously closed, notwithstanding the interlock 152 is opened by the operation of the relay 190, as this switch 190 by-passes such relay and the pushbutton 182. The cutting in of the high speed switch torque motor 89 is by way of slow down switch 194 at the control drum 133. The sequence of operations in stopping is as heretofore described: the roller 126 as riding on the cam end 114 of the drum 133 opening the slow down switch 194 to cut out the high speed windings and actuate the car 3 toward the fourth floor at slow speed, and as the car reaches such landing, the roller 126 for the stop switch 193 is operated by riding on the cam to open this stop switch 193. Automatically the elevator car 3 is brought to the fourth floor, where the one contemplating use of the car may open the landing gate promptly before the time lag switch 180 has closed, and thereby gain control of the car by selecting a floor by depressing a push button in the car panel 157 at once the car gate is closed.

The push button control of the direction torque motor 49 and of the high speed switch torque motor 89 in starting is to the exclusion of the low speed switch torque motor 64. This is effected by bringing from the line 24, line 195, past the interlock 60, closed before operation of the high speed switch motor 89, thereby connecting the lines 59, 20, 53, in circuit to energize the motor 49. As the motor 89 operates, the interlock 60 opens this circuit from the line 195, but for up direction, interlock 196, and for down direction interlock 197 are operated from the direction switch shaft 56 to connect the line 195 to the lines 20, 53.

As the switch 134 in the car 3 is actuated to change the car operation from manual to automatic, the throw over switch 22 cuts out the annunciators in the car 3 which disclosed to the car operator at which landing a signal button was pushed. The regular landing push buttons are effective for the annunciator. Transformer 198 reduces the annunciator circuit voltage from the supply lines 31, 44, which circuit is closed as the throw over switch 22 cuts in for manual operation and connects terminal 199 with terminal 156. Simultaneously the lines from the respective landings, as terminal 186, are connected, as to the terminal 200. Annunciator panel 201 in the car 3 is thus connected up for receiving the push button signals and disclosing such to the car operator.

The drum 5′, mounted on the shaft 6′ in the upper portion of the elevator shaft or well 1, is connected up to be actuated as to its surface or periphery at the lineal speed of the car 3. Accordingly, the surface speed of this control driving drum 5′ is similar to the surface speed of the hoisting drum 5. This provision of a separate drum permits retention of accuracy of control, which might be disturbed by stretching of the hoisting cable even were such anchored to the hoisting drum, instead of the traction type. The traction type might have additional cause for repeated adjustments, owing to slippage.

Anchor 202 at the elevator car 3 (Fig. 1) permits attachment of line 203 as a running control line extending upward about the control drum 5′, thence toward the bottom of the well 1 to pass about tension idler pulley 204, and then upward to anchor 205 on the car 3. Weight 206 loads the pulley 204 and tends to keep this control line 203 from slacking and in proper driving contact with the drum 5′. This auxiliary drive for the control is accordingly one which is not disturbed by various loadings of the car 3, and one which does not require very much adjustment to keep in condition for controlling the travel of the elevator car 3 for accurate stopping in the shaft 1. For instance, in car travel at 150 ft. per minute, with slow down to 25 ft. per minute, the automatic stopping herein occurs within ⅛ inch of the landing. There is no lost motion of intermediate connections to detract from niceties of adjustment. This

means close landing registering for freight service, as in loading and unloading trucks, while for passenger service the registry insures against any stub toe accidents.

What is claimed and it is desired to secure by United States Letters Patent is:—

1. An electric elevator installation embodying a car, a control line to the car, a control drum for the line, actuating means for the car independently of said control line and control drum, and a controller for the actuating means including means angularly rotative with said drum during normal travel of said car.

2. A hoisting drum, a control drum, a load connected to the hoisting drum, and actuating means from the load for rotating said control drum during all travel of the load.

3. A driving drum, axially shiftable control means rotating with said drum during normal rotation of said drum, a fixed support, and a control means actuated device anchored with the support eccentric of the axially shiftable control means to be actuated thereby.

4. A hoisting drum, a load therefor, a driving drum, a control drum, actuable from the driving drum, and driving connections between the load and driving drums for effecting similar surface linear travel rate for said driving drum and load during all travel of said load.

5. A driving drum, an axially shiftable rotatable coaxial control drum, a fixed support about said control drum, and a control drum actuated device anchored with the support eccentric of the control drum.

6. A driving drum, a control drum, connections from the driving drum to rotate the control drum therewith during all travel of the control drum, and guide means for the control drum axially of the driving drum.

7. A driving drum, a control drum, connections from the driving drum to rotate the control drum therewith during all travel of the control drum, and guide means for the control drum toward and from the driving drum.

8. A driving drum, a control drum, connections from the driving drum to rotate the control drum therewith, rotatable guide means for the control drum, threaded means effecting axial travel of the control drum, a fixed support about the control drum, and a device anchored with the support eccentric of the control drum, said device being disposed to be acted upon by said drum.

9. An axially shiftable rotatable control drum, a fixed support, switch means anchored with the support eccentric of the drum and directly actuable from the drum.

10. An axial shiftable rotatable control drum, fixed supporting means embracing said drum, and two series of switches anchored with the supporting means eccentrically of the drum and oppositely extending as to the drum.

11. An axially shiftable rotatable control drum, mounting rings, and means for anchoring switches thereto.

12. An axially shiftable rotatable control drum, mounting rings, and means for adjustably mounting switches on said rings.

13. An axially rotatable control drum, two series of switches, and angularly adjustable mounting means for the switches.

14. An elevator car, a hoisting drum for the car, an axially shiftable control drum coaxial with the driving drum, two series of switches, one for one direction of travel of the car and the other for the opposite direction travel of the car, and control means in the car for determining drum controlled switch operation.

15. An elevator car, a hoisting drum therefor, a control drum, two oppositely extending series of switches one for one direction of car travel and the other for the opposite direction of car travel, and control means in the car for predetermined drum control switch operation.

16. An eleavtor car, a hoisting drum therefor, a control drum, two oppositely extending series of switches one for one direction of car travel and the other for the opposite direction of car travel, and a cut out in the car for said control means.

17. An elevator car, a control therefor, a manual direction controller in the car shiftable into off position for effecting stopping of the car, a pre-selective landing control for the car including landing switches, and a throw over control operable from the car for cutting out the controller in the car and cutting in said pre-selective landing control.

18. An elevator car, a control therefor, a controller in the car shiftable into off position for effecting stopping of the car, an annunciator in the car, a pre-selective landing control for the car including landing switches, a throw over control operable from the car for cutting in the controller in the car and cutting out the selective control while placing said landing switches in operative connection with said annunciator.

19. In a multi-speed elevator car, low-speed and high speed actuating connections for the car, in combination with a controller in the car operable through said connections to cut in first low speed and then high speed in starting the car, and in addition to said controller a pre-selective landing control for the car for cutting in high speed for the car in starting to the exclusion of low speed.

20. In a multi-speed elevator car, and low-speed and high speed actuating connections for the car, in combination with a controller

in the car operable through said connections to cut in first low speed and then higher speed in starting the car, in addition to said controller a pre-selective landing control for the car cutting in high speed in starting the car to the exclusion of low speed, and connections for cutting in low speed in stopping as brought about by said pre-selective landing control.

21. In a multi-speed elevator car, and low speed and high speed actuating connections for the car, the combination of a pre-selective landing control embodying connections effective for starting the car on high and stopping the car on low speed.

22. An elevator car, a well for the car providing landings, actuated connections for the car including a switch and rotary means for opening and closing said switch, a pre-selective landing control embodying manually operable connections in the car and for a landing for starting and stopping the car by operating said switch, and a mechanical retarder lagging the operation of said switch from a landing connection only, said retarder being by-passed by said car connections, but as operable from a landing connection effective in permitting a passenger in the car a timed interval at a landing before a reselection of a manual connection at a landing may be effective for operating the car.

23. An eleavtor car, a well for the car providing landings, actuating connections for the car including a switch and rotary means for opening and closing said switch, a pre-selective landing control embodying manually operable connections in the car and for the landings for starting and stopping the car by operating said switch, a mechanical retarder by-passed by said car connections and effective through control from said landing connections for lagging the operation of said switch in permitting a passenger in the car a timed interval after reaching a landing, a door at a landing, and a safety circuit operable by the opened door to render reselection of a manual connection ineffective.

In witness whereof I affix my signature.

ERNEST B. THURSTON.