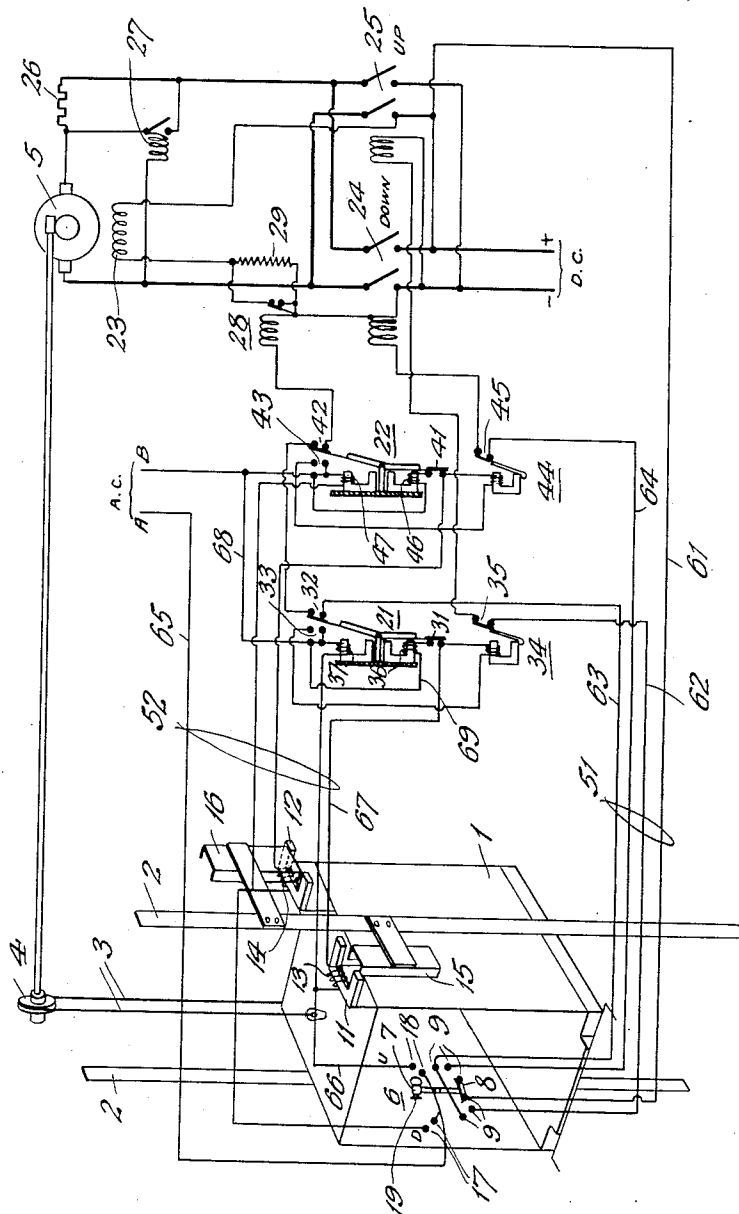


Jan. 22, 1929.

1,699,625

C. F. E. OLOFSON
ELEVATOR CONTROL DEVICE

Filed March 11, 1927



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ELEVATOR-CONTROL DEVICE.

Application filed March 11, 1927. Serial No. 174,656.

My invention relates to elevator control devices and particularly to control devices including an automatic means for bringing an elevator car to an accurate stop at a chosen floor level. My invention further provides such means in a construction which is substantially free from mechanically moving parts, subject to wear.

Elevators are now constructed for operation by electric power and for control by means of various electrical devices such as controllers, contactors and such like devices. The simpler systems depend exclusively upon the judgment of the operator for the making of accurate stops at the various floor levels. Means have been provided for the making of accurate stops by automatic mechanical devices, operated by the car itself, or operated indirectly from the machine which drives the car. These devices include means to open and close circuits for controlling the slowing down and stopping of the car at different points in the hatchway. These parts are all subject to wear, and in time the wear may interfere with the operation to such an extent that they fail to function.

My invention provides means for reducing the number of such moving parts, and substituting for them devices utilizing electromagnetic induction for the operating interrelationship at all of the floors, and I propose to retain only the positive limit switches at top and bottom of the shaftway, as mechanically operated devices. At all floor levels, between the limit switches, my invention utilizes an electromagnet inductive system, preferably energized by an alternating current. This device may constitute the primary actuating means, a portion thereof being positioned upon the car and other portions being positioned in the shaftway at suitable points, whereby the cooperation between them causes the retardation and stopping at the desired floor.

The energization of the inductive primary members of the control device, is in turn controlled by a member which may, if desired, be included in the construction of the main controller, but may also be independent thereof, so that actuation of it will cause a suitable interaction between the car members and the shaft members, to cause a retardation and stopping of the car, without the interposition of mechanically moving parts other than the controller member and the usual contactor

devices upon the usual control panel. The primary members of my invention comprise an auxiliary magnet system attached to the body of the car, cooperating with magnetic material members mounted upon the elevator shaftway at suitable points in relation to the various floors. The energization of the magnet system is controlled by a simple means such as a push-button within the car which may preferably be mounted upon the main controller handle. Interaction between the magnet system and the magnetic material members changes the impedance of the system and successive changes of impedance are utilized to retard and stop the car at positions determined by the relative setting of the primary members.

By the device of my invention I provide means whereby a rapid, accurate, automatic stop is made at a desired floor level by a very simple controlled device, which is substantially free from mechanically moving parts.

Other objects and structural details of my invention will be apparent from the following description when read in connection with the accompanying drawing, wherein:

The single figure is a diagrammatic representation of circuits and apparatus of the device of my invention.

Referring to the drawing, I provide, as shown, an elevator car 1 adapted to vertical motion in a shaft way between guides 2, supported by a cable 3 run over the sheave 4 which is driven by a motor 5. A car controller 6 is provided, which may be of any suitable pattern according to the type of drive employed. The controller desirably has an operating lever 7 with a contact shoe 8 cooperating with contact members 9 for the up and down motions of the car.

My invention further comprises a pair of magnetic sectional yokes 11 and 12 mounted upon a convenient point on the body of the car 1. The yokes 11 and 12 are respectively equipped with coils 13 and 14 as shown. Cooperating members 15 and 16 also formed of magnetic material are attached to the shaft frame at each floor as indicated. These members may be simple pieces of channel iron of suitable width, thickness and length, or may be of more elaborate structure, as desired.

The yokes 11 and 12 are desirably formed of sheet metal stampings stacked to the desired thickness. The sheet metal may be of any convenient material, such as transformer

iron, or other suitable sheet metal. The stampings are desirably formed in two parts, one a straight tongue member, and one an angle member in order that they may be stacked within the opening of a spool upon which the coil is wound. They may conveniently be a few inches in overall width and a few inches in overall length, and the body of the yoke may desirably be about an inch square in section or may be somewhat greater according to the requirements. The corners and ends of the sheet metal stampings may be perforated for the insertion of bolts after the assembly of the stampings to hold the whole in place and within the spool and coil. The yoke may be mounted upon the elevator car by any convenient means, such as strap iron members bolted to the yoke and to the car structure. These yokes may desirably be called the "indexing members" since they are the devices which when energized determine the stopping point of the car. The co-operating members 15 and 16 of low magnetic reluctance are adapted to complete a magnetic circuit between the arms of the yoke members 11 and 12. They may conveniently consist of sections of channel iron formed from such material as mild structural steel. The width of the members should be such as to make an easy fit with the ends of the yoke members. They are desirably of such size as to pass freely between the yoke arms, with sufficient clearance so that sidewise movement of the elevator car in its guides will not cause sufficient deviation of the yoke members sidewise to cause them to strike against the channel members. Alternatively the channel members may be formed in other ways which will be obvious, although the structure shown and described is preferable in that it makes possible a minimum length of path for magnetic flux in the magnetic circuit. By suitable choice of materials and dimensions, I find that the impedances of the coils 13 and 14 are readily adjusted to such a value that when connected in series with the associated contactor coil and a supply of 110 volts of alternating current, about 3 amperes of current will flow, and the insertion of the channel member between the yoke arms, is readily caused to reduce this value to about 1/2 ampere.

Auxiliary contacts 17 and 18 are provided in the controller 6, and a push-button contact 19 is provided upon the controller lever 7 so that connection may be made between the contacts 17 or the contacts 18 when the lever 7 is in the full up or full down position. Connections are made from one of each pair of contacts 17 and 18 to a source of alternating current as shown, and other connections are made from the others of the respective pairs 17 and 18 to the coils 13 and 14. Auxiliary contactors 21 and 22 are provided in connection with the control devices. These

contactors have magnets and coils connected as indicated to the contacts 17 and 18 and the coils 13 and 14 upon the car.

For purposes of illustration I have chosen to show as the driving means for an elevator incorporating my invention, a simple direct current motor system. My invention is however equally applicable to other systems of elevator control, such as those applied to alternating motor drive or those applied to the so-called "Ward-Leonard" system. The changes necessary to apply the device of my invention will however be obvious to those skilled in the art to which it appertains.

In the particular illustration chosen, I provide a direct current motor 5 having a field winding 23. The motor is desirably supplied from a source of direct current energy as indicated, through contactor devices 24 and 25, of which 24 may desirably provide the down motion and 25 the reverse or up motion. A starting resistance 26 is desirably provided under the control of an automatic accelerating contactor 27, which may be of any desired form and may provide for one or more successive acceleration steps.

The contactors 21 and 22, which cooperate with the coils 13 and 14 upon the indexing yokes 11 and 12, each contain two actuating coils upon separate magnetic circuits, with a V-shaped armature member cooperating with both magnetic circuits, one arm of the V serving as armature for one core and coil, and the other serving as armature for the other coil and core. The armature is pivoted at the point of the V so that movement of one arm towards its core moves the other arm away from its core. Contacts are provided upon the respective armature arms, two pairs of contacts being adapted to be closed in one position and another pair of contacts only to be closed in the other position. The armature is biased by gravity or other suitable means so that it normally remains in a position to close the two pairs of contacts, the so-called "back contacts". The coil 36 is connected through the back contacts 31 in series with the coil 13 of the indexing yoke 11 and also through the wires 69 and 68 to the source of A. C. supply. The coil 37 is connected directly between the contacts 18 in the controller 6 and the source of A. C. supply. The other pair of back contacts 32 are connected in series between the full speed contact in the controller 6 and the relay contactor 28 controlling the field resistance 29. The front contacts 33 are connected between the source of supply and the coil of contactor 34, which in turn is connected to the contacts 31 and the coil 13. The contacts 35 of the contactor 34 are connected in series between the up contact in the controller 6 and the coil of the up contactor 25. Under these conditions, if current is thrown simultaneously upon the coils 36 and 37, and of about equal values, the contactor position remains un-

changed. If, however, the current flowing in coil 36 is substantially reduced in value the pull of the flux produced by coil 37 will overpower that from coil 36 and the contactor position will change, opening contacts 31 and 32 and closing contacts 33. Contactor 34 may then take the current from coil 13 because of the closure of contact 33. This contactor 34 may desirably be adjusted so that a small value of current will not actuate it but a larger value will.

A similar contactor 22 is provided for the down motion, having back contacts 41 and 42, front contacts 43, a holding coil 46 and a closing coil 47. An auxiliary contactor 44 having contacts 45 is also provided.

Connection is desirably made between the contactor relays on the switchboard and the control apparatus in the car by providing flexible cable conductors, as at the points 51 and 52, in order that connection may be maintained between the moving car and the stationary control apparatus and control board.

In describing the operation of my invention, it is convenient to begin with the car stationary at a floor. The operator may then start the car under way by movement of the controller handle. If he desires to go upward, he throws the controller handle towards the right, the up position, thereby bringing the contact shoe 8 across the first and second of the left-hand set of contacts 9. This closes a circuit from the positive D. C. supply main through a wire 61 to the first of the contacts 9, then to the contact shoe, the second of contacts 9, wire 62, contacts 35 of relay 34, the closing coil of contactor 25 back to the negative D. C. main. The closure of contactor 25 applies current to the motor 5 through the armature resistance 26. The field winding 23 is energized at all times by a current from the supply mains through the circuit connections indicated, which may include the contacts of the contactor 28, if the contactor is unenergized. The motor thereby begins its rotation and moves the car upward. As it gains in speed, the counter E. M. F. of the motor increases, until at a predetermined value the contactor 27 closes, short circuiting the resistance 26, whereby a second and higher motor speed is obtained. The operator may then move the controller lever 7 to the full speed position, thereby bringing the contact shoe 8 in contact with all three of the left-hand set of contacts 9. Supply current then passes in addition from the wire 61 through the wire 63, the contacts 32 of relay 21, the contacts 42 of relay 22 to the coil of relay 28, and back to the negative main. The energization of relay 28 opens its contacts and throws the field resistance 29 in circuit with the field coil 23 thereby weakening the field, and increasing the elevator speed.

In this "on" position of the controller 6, the push-button element 19 in the controller

lever 7 is brought over the contactor 18 and thus becomes available for use, to stop the car accurately at a desired floor level. To stop the car by this means, the operator has only to push the button 19 in the handle 7 without moving it from the "on" position. By so doing, he completes a circuit across the contacts 18. The closure of these contacts provides a circuit for the alternating current from the main A by the wire 65 through the contacts 18 to the wire 66. The wire 66 leads through the cable 52 to the coil 37 of relay 21, and thereafter back to the main B of the alternating current supply. A tap connection is made from a terminal of the coil 13 upon the yoke 11 to the wire 66 on the car, and a wire 67 is led from the other terminal of the coil 13, through the cable 52 to the contacts 31 of the relay 21 and thereafter to the coil of the contactor 34, and contact 32 of contactor 21, which are in turn connected by a wire 68 to the main B of the alternating current supply. From the contacts 31 a path for a current is also provided through the coil 36 of relay 21, the wire 69 to the wire 68 and the main B of the alternating current supply.

Under these conditions with the contacts 18 bridged by the push-button, current flows through the coil 37 of the relay 21 and also through the coil 13 on the car and the coil 36 of the contactor 21. The current in the coil 36 holds the contactor in the position indicated, with the contacts 31 and the contacts 32 closed. Relay 22 is not energized because of the fact that the contacts 17 are not closed.

This condition obtains only until the car, in its upward motion, brings the yoke 11 adjacent the iron member 15. The presence of the iron member 15 between the arms of the yoke 11 reduces the magnetic reluctance of the iron circuit therein and thereby increases the impedance of the coil 13. This in turn results in a reduction of the current flowing in the coils 13 and 36. The current in the coil 37 remains unchanged and the difference in relative strength of the magnetic cores is such that the armature shifts its position to bring its upper arm in close contact with the core within the coil 37. This opens the contacts 31 and 32 and closes the contacts 33. The opening of the contacts 31 breaks the circuit through the coil 36, and the opening of the contacts 32 de-energizes the contactor 28 thereby short circuiting the resistance 29 and slowing down the motor. The elevator car is thus decelerated during the time that the member 15 is between the arms of the yoke 11.

When the car in its upward travel traverses the yoke 11 beyond the member 15, the magnetic reluctance of the yoke 11 is increased to its previous value and the impedance in the coil 13 is thereby decreased. The increasing current is then sufficient to attract the arma-

ture of the contactor 34, thereby separating the contacts 35 and thus opening the circuit through the operating coil of the contactor 25. This operation disconnects the motor 5 from the power supply and by appropriate apparatus and connections, not shown, applies the customary solenoid brake to the motor shaft and stops the car, whereafter the operator may open the door for the discharge 10 of passengers.

Door interlocks are desirably provided to prevent the movement of the car while the door is opened in the fashion which are well known in the prior art and the application of 15 which will be obvious to one skilled in the art.

The operator thus as described stops his car by the actuation of the push-button 19 without moving the lever 7 from the full 20 speed upward position. After having closed the doors he may then resume travel of the car in the original direction by merely releasing the push-button 19 which opens the circuit at the contacts 18, de-energizes the coil 25 37, allowing the contactor 21 to resume its original position as indicated, and de-energizing the coil 13 and the relay 34 thereby closing the contacts 35 and re-energizing the coil of the contactor 25, thus reconnecting 30 the motor to the circuit for the appropriate direction of travel. The contactor 27 of course opens upon the de-energization of the motor and the power is accordingly applied through the resistance 26 to start and the resistance is automatically cut out by the contactor 27 as before. The closing of the contacts 32 applies current to the contactor 28 35 which opens its contacts and weakens the field 23 by the insertion of the resistance 29, and the motor 25 accordingly makes a rapid start. The operator is thus enabled to make a rapid accurate automatic stop at the desired floor, and thereafter to make an equally rapid start, by the simple movement of the 45 push-button 19. The simplicity of these operations and the accurate automatic stopping and starting result in very rapid handling of the car, and accordingly much more rapid service.

My invention thus provides means for the automatic pre-set actuation of the elevator control at a desired floor. The point in the car travel at which the fixed member 15 enters the yoke member, determines the point at 55 which the slowing down of the car is begun, and the point at which the fixed member leaves the yoke member determines the point at which the power is shut off and the brakes applied. These points remain constant as long as the relative positioning of the primary members upon the car and in the shaft-way remain unchanged. They accordingly provide great accuracy of stopping which remains constant while the elevator is in use. 65 The operation is substantially automatic

aside from the necessity of choice of the floor at which the stop is to be made. The accuracy of the automatic stopping avoids all necessity on the part of the elevator operator for "inching" his car to level it with the 70 door-sill as is often necessary with purely manual control means. It likewise avoids the necessity for reversal of travel which is otherwise essential if the operator "over-shoots" the stop. The point at which the stop is begun and completed is thus very easily adjusted by adjustment of the length of and the position of the armature in the shaft. 75

For the down motion, a similar sequence of events occurs, by the closure of the right-hand set of the contacts 9 by the contact shoe 80 8 for the first start in the down direction. A stop may be made in a similar way from the down motion by the closure of contact 17, button 19, and energization of the coil 14 85 on the yoke 12, and the contactors 22 and 44. The circuits and operation for a stop during the down motion are closely similar to those for the up motion, except that a different stationary member 16, positioned above the stopping point is brought into play, and an alternative but similar contactor 22 functions 90 when the down contactor 24 is closed.

By this device of my invention, it is thus possible to obtain a substantial increase in 95 the speed of handling of an elevator device. By it much more rapid and much more accurate stops of the elevator car are made and likewise much more rapid starts are obtained, resulting in a greater number of trips in a 100 given time and thereby the handling of a greater number of passengers in a given car, greatly increasing the peak load capacity of the elevator system.

While I have shown but a single embodiment of my invention, as applied to a very simple elevator and control system, it is capable of many modifications therefrom, such as are desirable for incorporation thereof into the systems and apparatus of more 110 complex and more elaborate elevator control systems, without departing from the spirit thereof, and it is desired therefore that only such limitations shall be imposed thereon as are required by the prior art or indicated by 115 the appended claims.

I claim as my invention:

1. The method of controlling the actuation of an elevator device, which comprises energizing a variable impedance, varying the 120 value thereof in accordance with movement of an elevator car in a shaft and actuating a circuit controlling contactor thereby.

2. The method of controlling the movements of an elevator car which comprises 125 energizing a variable impedance device, changing the impedance thereof by movement with respect to a permeable stationary member, utilizing the increase in impedance to slow down the car, and further utilizing 130

a succeeding decrease in impedance to stop the elevator car.

3. The method of operating an elevator car which comprises starting the car in a given direction by movement of a controller handle and closure of an appropriate circuit contactor, thereafter establishing circuits for a stop at a desired floor level by energizing a changeable impedance movable with the elevator car, increasing the impedance therein by cooperation therewith of a stationary permeable member, changing the contactor position by the change in impedance, to slow down the elevator car, reducing the impedance of the adjustable impedance by withdrawal therefrom of a stationary permeable member, utilizing the decrease in impedance to make a further change in relay position, and thereby stopping the elevator car.

4. The method of operating an elevator car which comprises starting the car in a given direction by movement of a controller handle and closure of an appropriate circuit contactor, thereafter establishing circuits for a stop at a desired floor level by energizing a changeable impedance, movable with the elevator car, increasing the impedance therein by cooperation therewith of a stationary permeable member, changing the contactor position by the change in impedance to slow down the elevator car, reducing the impedance of the adjustable impedance by withdrawal therefrom of the stationary permeable member, utilizing the decrease in impedance to make a further change in relay position, and thereby stopping the elevator car, and thereafter returning the relays to the position of travel in the original direction by a de-energizing of the impedance.

5. An elevator control device comprising a pair of magnetically associated, mechanically independent members, one thereof being stationarily attached to said elevator shaft, the other thereof being attached to the elevator car in such position as to cooperate with the stationary member to vary the reluctance of a magnetic circuit, and a coil so situated that variations of impedance will be produced herein by variations of reluctance of said magnetic circuit and being adapted to thereby vary the flow of alternating current therethrough.

6. In an elevator control device, a magnet member having a cooperating coil attached to an elevator car, and adapted by changes of impedance to vary the strength of alternating current flowing therethrough, a cooperating stationary member in the elevator shaft so situated as to cooperate with said magnet member for changing the impedance of said coil.

7. In an elevator control device, a magnetic yoke member having a cooperating coil, attached to an elevator car, and adapted to be energized by alternating current, a stationary

member adapted to be attached to an elevator shaft and to cooperate with said yoke member for changing the impedance thereof, means comprising contacts in said elevator car for energizing said coil, and means comprising a contactor device having coils associated with said first mentioned coil, and contacts cooperating with a driving means for said elevator, whereby the movements of said elevator are controlled.

8. In an elevator car device, a controlling means comprising a plurality of yoke members and associated coils attached thereto, a plurality of stationary magnetically permeable members attached to the elevator shaft structure, a plurality of contactor means within said car, adapted to supply alternating current, alternatively to said coils, a plurality of relay contactor members respectively connected to said coils and said car contacts, and actuated in accordance with the energization thereof, a driving motor for said elevator car, circuit control members comprising relay contactor devices and additional connected contacts within said elevator car for controlling the up or down movement of said car, and additional connections between said first mentioned contactors and said motor contactors for slowing down and stopping said motor by the combined effect of said first mentioned contacts and said coils respectively.

9. In an elevator control device, a magnet member mounted on the car, a magnet member in the elevator shaft, a coil so associated with one of said magnet members that its impedance is varied by changes in the reluctance of the magnetic circuit and a contactor device operable by changes in the impedance of said coil to control the movements of said elevator car.

10. In an elevator control system, a device adapted to have its magnetic permeability changed by relative movement with respect to elevator shaft members, means comprising an associated coil adapted to be affected by the change in permeability, means comprising a contactor device connected to said coil and adapted to affect control circuits for the slowing down and stopping of said elevator by successive changes in permeability in said member, and a cooperating manually operable member for choosing the point at which said change in permeability becomes effective to control said elevator car.

11. In an elevator control device, in combination, a manual control means for the stopping and starting of said elevator including the determination of the direction of travel, and an auxiliary control means adapted to stop and start said car in the direction of travel determined by said manual controlling means, including cooperating magnetic actuating means, a coil, the impedance of which is varied by said magnetic actuating

means, and means actuated by changes of such impedance for reducing speed, interrupting current supply and applying brakes at previously set points upon the actuation of said auxiliary control means.

12. In an elevator control system, a car controller comprising a main control lever, contacts for up motion and contacts for down motion, a motor and drive gear for the actuation of said elevator, cooperating control means including contactors connected between said car controller and said motor for the control thereof, and an auxiliary control means incorporated in said controller for the independent actuation of said control means for stopping and starting the car during the travel in a given direction while said main control lever occupies an operating position.

13. In an elevator control system, a car controller comprising a main control lever, cooperating contacts for up motion and for down motion, a motor and drive gear for the actuation of said elevator, cooperating circuit control means including contactor relays connected between said elevator controller and said motor for the control thereof, and an auxiliary control means incorporated in said controller for the independent actuation of said circuit control means for stopping and starting the car during the travel in a given direction without movement of said main controller member, said auxiliary control comprising cooperating members mounted upon said car and said shaft adapted to change the impedance of a circuit connected to said auxiliary controller device for actuating said control devices at a selected one of a group of previously set points.

14. In an elevator control, a main control lever and cooperating contacts for starting said car in a predetermined direction, and auxiliary means, including a plurality of contacts on the car adjacent the path of said lever, and circuits controlled thereby, and a push button carried by said lever and adapted to engage with one or another of said last named contacts according to the position of said controller handle, and connections and apparatus for stopping and starting said elevator according as said push-button contact circuits are closed or opened, in the direction determined by the position of said controller handle.

15. In an elevator controller, a master control lever, and cooperating contacts for operating the car, an auxiliary switch incorporated in said control lever, and auxiliary contacts for the actuation of auxiliary motor control circuits while the control lever occupies an operating position.

16. In an elevator controller, a master control lever and an auxiliary control push-button incorporated therein, including auxiliary contacts for the actuation of auxiliary control circuits, and means comprising circuits

and contactors for slowing down and stopping said elevator car upon the actuation of said push-button when said control lever is in operating position, and for resuming travel in the same direction upon release of said push-button.

17. In an elevator control device, a variable impedance device actuated in accordance with the movements of said elevator car, a manually operated energizing means for the application of current thereto upon approaching a desired stopping point, and means comprising a relay system adapted to slow down said elevator car upon change of impedance, and to stop said elevator car upon another change in impedance.

18. In an elevator control device, a variable impedance device actuated in accordance with the movements of an elevator car, a manually operated circuit closure for the application of current thereto, means comprising a relay device adapted to be actuated by a change in impedance in said variable impedance device upon energization thereof, and operative to reduce the speed of said elevator car, and means comprising an additional relay, operative by a sequential change in impedance in said impedance device, when energized, to stop said elevator car.

19. In an elevator control system, a plurality of variable impedance devices and contactor relay assemblies, and manual circuit closing means operable to energize one or the other thereof, one group being effective to control by variations in impedance the movements of said elevator in an upward direction, and the other being independently effective to control by variations in impedance the movements of said elevator car in a downward direction.

20. In an elevator control device, a control system comprising a plurality of impedance devices attached to an elevator car, and a plurality of magnetically permeable members cooperating therewith and stationarily attached to the elevator shaft, one thereof being effective in approaching a floor level stop from above, and the other being effective upon approaching the same stop from below.

21. In an elevator control device, a controller having contact members for the normal control thereof including selection between upward and downward directions, and auxiliary contact members for the actuation of auxiliary control devices to stop and start said elevator without moving the controller from operative position.

22. In an elevator control mechanism, in combination, a variable impedance device and a contactor relay, said contactor being biased to an on-position and being equipped with a plurality of magnetic circuits, coils and contacts, one of said coils being connected in circuit with said variable impedance element, said coils being adapted to hold said

relay contacts in said biased position under full current, one of said coils being adapted to overcome the other upon a change in impedance of said impedance device.

23. In an elevator control mechanism, in combination, a variable impedance device and a contactor relay, said contactor being biased to an on-position and being equipped with a plurality of magnetic circuits, coils and contacts, one of said coils being connected in circuit with said variable impedance element, said coils being adapted to hold said relay contacts in said biased position under full current, one of said coils being adapted to overcome the other upon a change in impedance of said impedance device, and an auxiliary contactor relay associated with said main relay, and adapted to be actuated by a second change in impedance of said impedance element.

24. In an elevator control device, a controller element comprising main control members for determining the direction of travel, and auxiliary control members effective to stop and start in a given direction only without movement of the main control element from its operative position, and means for rendering said auxiliary members effective with respect to a floor level.

25. In an elevator control device, in combination, a main control system and an auxiliary control system, a controller having an operating lever and contact members for up and down motion and speed, corresponding cooperating circuit closing contactor relay devices, a power supply circuit, a driving motor connected thereto by said contactors, motor accelerating means, and motor speed control means, comprising said main control system, said auxiliary control system comprising auxiliary contacts in said car, a magnetic yoke member and coil, and another magnetic member, respectively mounted upon the elevator car and the shaft frame, a plurality of contactor relays connected to said contacts and said coil, energized by current through said contacts, and actuated by change of current in said coil, one of said contacts being associated with said main speed control device, and another of said contacts, being associated with said main contactor device.

26. In an elevator control device, a main control system and an auxiliary control system, a controller having an operating lever and contact members for up and down motion and speed, corresponding cooperating circuit closing contactor relay devices, a power supply circuit, a driving motor connected thereto by said contactors, motor accelerating means, and motor speed control means, comprising said main control system, said auxiliary control system comprising auxiliary contacts in said car, associated with said controller operating lever therein and

alternatively operative according to the position thereof under the control of an operator, a magnetic yoke member and coil, and another magnetic member, respectively mounted upon the elevator car and the shaft frame, a plurality of contactor relays, connected to said contacts and said coil, energized by current through said contacts, and actuated by change of current in said coil, one of said contacts being associated with said main speed control device, and another of said contacts being associated with said main contactor device.

27. In an elevator control system, a main control means comprising a car controller having an actuating lever and contacts, circuit closing relays, a power supply, a motor supplied therefrom through said relays, an auxiliary control system comprising car contacts and a pair of magnetic yoke members, coils thereon, and members for varying the impedance thereof, a plurality of double throw connector members respectively associated therewith, each having front contacts and back contacts and adapted to be actuated by a change in impedance in said yoke coil, means comprising circuits and relays connected to said contacts whereby an actuation of one of said double throw relays slows down said driving motor and prepares circuits for a stop, an auxiliary relay having contacts associated with said main control system and actuated by current from said auxiliary control system to stop said motor upon another change in impedance in said coil.

28. In an elevator control system, stopping means comprising a movable contactor, means for operating the contactor comprising opposing circuits, one of said circuits including an impedance coil, and means for varying the impedance of said coil to cause one of said circuits to overpower the other and thereby operate the contactor.

29. In an elevator control system, stopping means comprising a movable contactor, means for operating the contactor comprising opposing circuits, one of said circuits including an impedance coil, and means controlled by the movement of the car in the shaft for varying the impedance of said coil to cause one of said circuits to overpower the other and thereby operate the contactor.

30. In an elevator control system, stopping means comprising a movable contactor, means for operating the contactor comprising opposing circuits, one of said circuits including an impedance coil and means under control of the operator for energizing the impedance coil and thereby causing one of said circuits to overpower the other and operate the contactor.

31. In an elevator control system, stopping means comprising a movable contactor, means for operating the contactor comprising an electromagnet, an electric circuit for ener-

gizing said magnet, an impedance coil separate from said electromagnet, and means responsive to the movement of the elevator car for varying the impedance of said coil to vary the current flow and thereby cause said electromagnet to operate the contactor.

32. In an elevator control system, stopping means comprising a movable contactor, means for operating the contactor comprising an electromagnet, an electric circuit for en-

ergizing said magnet, an impedance coil separate from said electromagnet, and means under control of the operator for varying the impedance of said coil to vary the current flow and thereby cause said electromagnet to operate the contactor.

In witness whereof, I hereunto subscribe my signature.

CARL F. E. OLOFSON.

DISCLAIMER

1,699,625.—*Carl F. E. Olofson*, West Orange, N. J. ELEVATOR-CONTROL DEVICE. Patent dated January 22, 1929. Disclaimer filed July 6, 1931, by the assignee, *A. B. See Elevator Company, Inc.*

Hereby enters this disclaimer of that part of the claim in said specification which is in the following words, to wit:

"12. In an elevator control system, a car controller comprising a main control lever, contacts for up motion and contacts for down motion, a motor and drive gear for the actuation of said elevator, cooperating control means including contactors connected between said car controller and said motor for the control thereof, and an auxiliary control means incorporated in said controller for the independent actuation of said control means for stopping and starting the car during the travel in a given direction while said main control lever occupies an operating position."

"21. In an elevator control device, a controller having contact members for the normal control thereof including selection between upward and downward directions, and auxiliary contact members for the actuation of auxiliary control devices to stop and start said elevator without moving the controller from the operative position."

"24. In an elevator control device a controller element comprising main control members for determining the direction of travel and auxiliary control members effective to stop and start in a given direction only without movement of the main control element from its operative position, and means for rendering said auxiliary members effective with respect to a floor level."

(*Official Gazette August 4, 1931.*)