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C. T. WESTLIN.

ELECTRICALLY CONTROLLED ELEVATOR.

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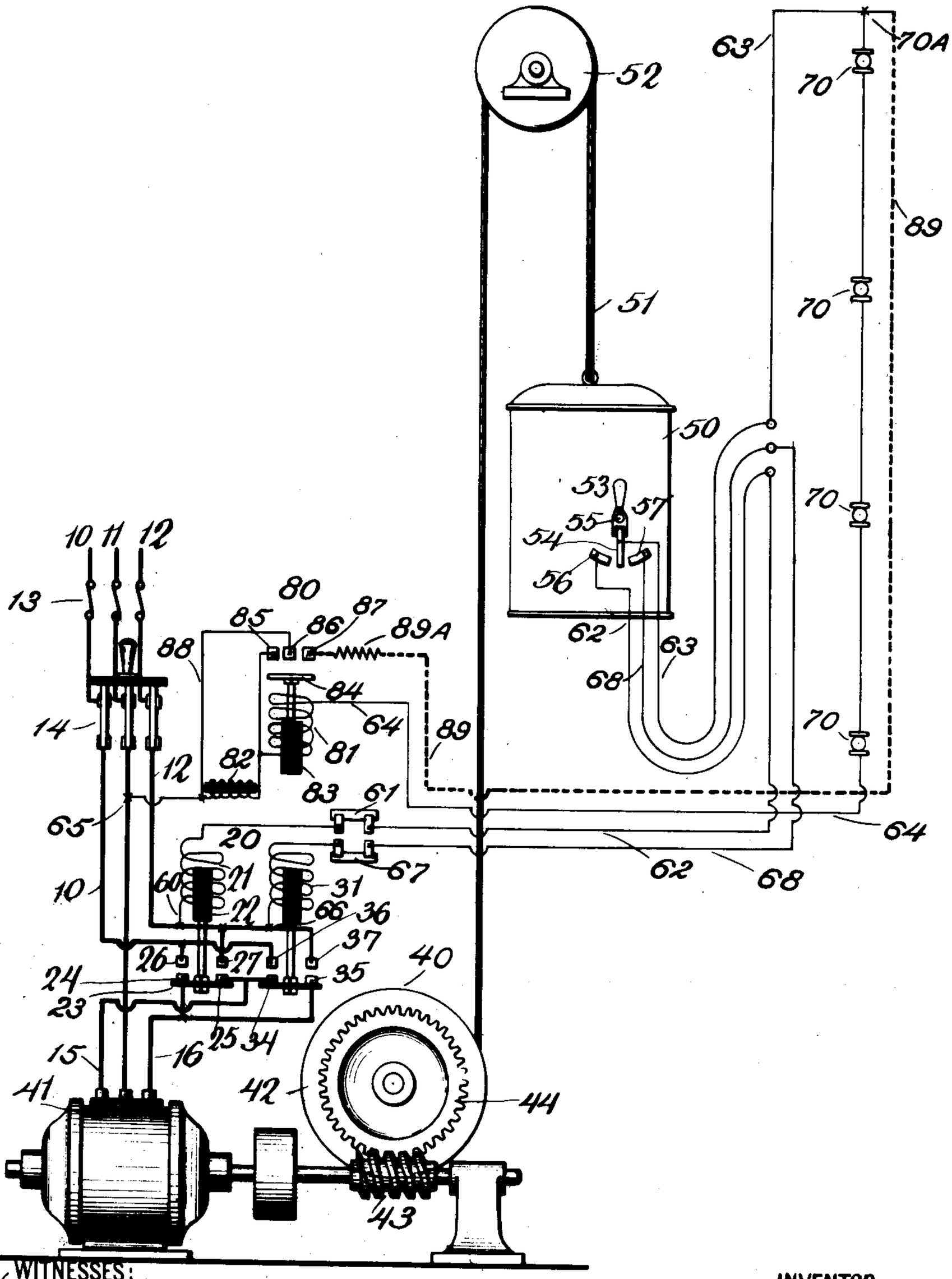

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ELECTRICALLY-CONTROLLED ELEVATOR.

No. 869,760. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed March 2, 1907. Serial No. 360,284.

To all whom it may concern:

Be it known that I, CARL THORSTEN WESTLIN, a subject of the King of Sweden, and a resident of the city of Arlington, in the county of Hudson and State of New Jersey, United States of America, have invented certain new and useful Improvements in Electrically-Controlled Elevators, of which the following is a specification.

My invention relates to electrically controlled elevators and its object is to overcome some of the difficulties present in elevators of this general class. Elevators of this class are often provided with door-locks through which the circuit of the controlling-switch passes whenever the door or doors are closed and latched, but which are arranged to automatically open the controlling-circuit and thus render it inoperative when a door thus equipped is unlatched or opened. Many such door-locks have been devised and are well known in the art; for example, see Patent No. 687,775, issued to Norton P. Otis and August Sundh December 3, 1901. My invention is especially applicable to such electrically controlled elevators as are provided with some form of electric door-locks such as that cited.

I will describe my invention in the following specification and point out the novel features thereof in claims.

The drawing filed herewith is a diagrammatic representation of certain parts of an electrically controlled elevator apparatus showing a simple wiring system connecting the various parts and showing my invention applied thereto.

In the drawing, 10, 11 and 12 designate mains from a suitable source of alternating current supply which, after passing through fuses 13 and a manually operated main-line switch 14, pass to various apparatus which I will now point out. These main conductors are represented in the drawing by heavy lines.

20 designates an electrically operated reversing-switch which comprises a magnet winding 21 and a core 22 within the winding. This core is connected with a horizontal strip 23 of insulating material upon which are mounted movable contacts 24 and 25 which are arranged to be moved up against stationary contacts 26 and 27, respectively, whenever the magnet winding 21 is energized. This reversing-switch also comprises a similar magnet winding 31 which is arranged to move movable contacts 34 and 35 up against stationary contacts 36 and 37, respectively, when the magnet winding 31 is energized.

The main-line conductor 10 is connected to the stationary contacts 26 and 36 and the main-line conductor 12 is connected with stationary contacts 27 and 37.

40 designates a hoisting apparatus which comprises an alternating current motor 41 which is connected with and arranged to drive a drum 42 through a worm 43 and a gear 44 which is in mesh therewith. The main-line conductor 11 is connected to the middle terminal of the motor 41. The left hand terminal of the motor is connected by a conductor 15 with the movable contacts 25 and 34 of the reversing-switch 20 and the right-hand terminal of the motor is connected by a conductor 16 with the movable contacts 24 and 35 of the reversing-switch.

50 designates an elevator-car which is connected with the drum 42 by means of a rope or cable 51 which passes over a sheave 52 mounted near the upper end of the travel of the elevator-car. 53 designates a manually operated switch in the car which comprises a lever 54 pivoted at 55, which lever is arranged to be moved onto a stationary contact 56 or another stationary contact 57.

I will now trace out some of the circuits and describe the operation of this device.

At 60 the lower end of the magnet winding or coil 21 of the reversing switch 20 is attached to the main-line conductor 12. The circuit continues through this coil 21 and through an automatic limit-switch 61 by conductor 62 to the stationary contact 56 in the car-switch 53. If the operator in a car moves the pivoted lever 54 onto this stationary contact 56 a circuit is completed thereby through the car-switch and through conductor 63, a series of door-locks 70, 70, conductor 64 through the magnet winding or coil 81 of a special automatic relay magnet 80, which I will more fully describe later, through a choke-coil 82 and to the main-line conductor 11 to which it is attached at 65. The circuit thus established energizes the left-hand portion of the reversing-switch 20 and causes its movable contacts 24 and 25 to be moved up against the stationary contacts 26 and 27. This causes the main-line conductor 10 to be connected through contacts 26 and 24 and conductor 16 to the right-hand terminal of the motor 41, and at the same time causes the main-line conductor 12 to be connected through contacts 27 and 25 and conductor 15 to the left-hand terminal of motor 41. Thus the motor becomes energized and causes the drum 42 to be rotated which causes the car 50 to be moved in one direction. This movement of the hoisting mechanism and the car will continue until the operator brings the lever of the car-switch 53 back to its central position, or until the automatic limit-switch 61 is opened. This automatic limit-switch is a well known device and is arranged to be actuated by the movement of the car or the hoisting mechanism to be opened whenever the car reaches the limit of its travel in one direction.

If the operator in the car moves the pivoted lever 54

onto stationary contact 57, a circuit is completed thereby from the point 66, where the lower end of reversing-switch magnet-coil 31 is connected to the main-line conductor 12, through this coil, through an automatic limit-switch 67, similar to the one above described, through conductor 68 to the stationary contact 57; thence, through pivoted lever 54, conductor 63, door-locks 70, conductor 64, relay magnet winding 81, choke-coil 82, to the main-line conductor 11 at 65. This will cause the right-hand portion of the reversing-switch to become energized and the main-line conductors 10 and 12 to be thereby connected with the left-hand and right-hand motor terminals, respectively. The motor will thereby become energized and will rotate in the opposite direction to that which it had rotated before.

The parts above described and their operation are well known in the art and I have pointed them out briefly merely to illustrate a simple form of elevator control to which my invention may be applied.

It has been found in constructions of this kind that the strength of current which passes through the door-locks 70 is a frequent cause of trouble. Most of the door-locks now in use are constructed with small and delicate parts which operate satisfactorily so long as the current which passes through them is not great, but it has been found necessary in many systems of electrically controlled elevators to use a current of considerable amount in the operating circuits and the consequence is that the contacts and conductors within the door-locks are subject to disastrous sparking and burning. This is especially true with such systems as are used in conjunction with alternating currents. In the present system I have devised a means for reducing the current which pasess through the door-locks to a minimum by a simple expedient and without in any way reducing the effectiveness of the controlling circuits or of the door-locks.

In tracing out the controlling circuits which are shown in the diagram by light lines, I show that the car-switch circuit passes through a magnet winding 81 of a relay magnet 80 and also through a choke-coil 82. The magnet winding 81 thereby becomes energized whenever the operating circuit is closed by a movement of the car-switch 53 and thereupon raises its core 83 and an associated contact-plate 84 until the latter is raised up against three stationary contacts 85, 86 and 87 and thereby electrically connects these three stationary contacts together. This results in short-circuiting the choke-coil 82 between the contacts 85 and 86, and in closing a circuit directly from the main-line conductor 11 through a conductor 88 to the stationary contacts 86 and 87 which are now connected together, and thence through an auxiliary circuit 89 which is designated in the drawing by a dotted line. This auxiliary circuit 89 is connected to the upper terminal of the door-lock circuit as is shown at 70^{A}. A resistance 89^{A} is included in this circuit to regulate the amount of current which may flow through it.

It is evident that a portion of the current supply for the controlling circuit will now pass directly from the main-line conductor 11, through the auxiliary circuit 89 and conductor 63 to the car-switch, and a portion of the current supply will continue to pass through the door-lock circuit. The relative amount of current which passes through these two circuits will depend entirely upon the resistance of the door-lock circuit and on the resistance of the auxiliary circuit, and this proportion may be controlled by the resistance 89^{A}.

It may also be seen that whenever the apparatus is at rest the door-locks will control the operating circuit in the same manner as they usually do, and that if the circuit is broken at one of these door-locks the electrical control of the elevator is made inoperative thereby. As soon as the controlling circuits are energized a portion of the supply of current is shunted through the auxiliary circuit 89 so that the current passing through the door-locks is materially reduced to any desired amount. If, during the operation of the elevator itself, one of these door-locks becomes opened for any cause the relay magnet 80 will immediately become deënergized and the current supply to the car-switch through the auxiliary circuit 89 will thereby be cut off.

I have shown a choke-coil 82 in series with the winding of the relay magnet 80. This is an improved device to use in conjunction with alternating current systems under certain conditions but is not, of course, a necessary adjunct to the carrying out of my invention. I have illustrated my invention in conjunction with a simple form of alternating current electrical control, but it is, of course, applicable to any form of electric elevator in which automatic electric door-locks are used, or it may be applied, as well to other than electric elevators so long as the controlling system for such elevators depends upon the electric current passing through automatic door-locks. It is a matter requiring nothing but mechanical skill to make the necessary modifications to my invention to apply it to different forms of elevators and controlling systems.

What I claim is.—

1. In an electrically controlled elevator, the combination of a circuit adapted to carry a controlling current, a door-lock in the circuit, said door-lock arranged to break the path of the circuit when the door-lock is open, and means for shunting a part of said current around the door-lock.

2. In an electrically controlled elevator, the combination of a circuit adapted to carry a controlling current, a door-lock in the controlling circuit, said door-lock arranged to break the path of the circuit when the door-lock is open, an auxiliary circuit around the door-lock, and automatic means for holding said auxiliary circuit closed whenever a current flows through the controlling circuit.

3. In an electrically controlled elevator, the combination of a circuit adapted to carry a controlling current, a door-lock and an electroresponsive device in said circuit, contacts associated with said door-lock, and arranged to break the path of the circuit when the door-lock is open, and an auxiliary circuit around the door-lock, said electroresponsive device being arranged to automatically hold the auxiliary circuit closed whenever a current flows through the controlling circuit.

4. In an electrically controlled elevator, the combination of a circuit adapted to carry a controlling current, a series of door-locks through which said circuit passes when all of said door-locks are closed, an electroresponsive device in said operating circuit, an auxiliary circuit around the door-locks, and a resistance in the auxiliary circuit, said electroresponsive device being arranged to automatically hold the auxiliary circuit closed whenever a current flows through the controlling circuit.

5. In an electrically controlled elevator, the combination of a car, a controlling-switch in the car, a circuit adapted to carry a controlling current, said circuit being connected with the car-switch, a series of door-locks through which

said circuit passes when all of said door-locks are closed, an electroresponsive device in said operating circuit, an auxiliary circuit around the door-locks, and a resistance in the auxiliary circuit, said electroresponsive device being arranged to automatically hold the auxiliary circuit closed whenever a current flows through the controlling circuit.

6. In an alternating current electric elevator, the combination of a circuit adapted to carry a controlling current, a plurality of door-locks through which the circuit passes when all of said door-locks are closed, an electroresponsive device in said circuit, a choke-coil in series therewith, an auxiliary circuit around the door-locks, and a resistance in said auxiliary circuit, said electroresponsive device being arranged to automatically hold the auxiliary circuit closed whenever a current flows through the controlling circuit and short-circuiting the choke-coil.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL THORSTEN WESTLIN.

Witnesses:

E. A. STRONG,

BROR E. WESTLIN.