H. A. HUMPHREY.

ELEVATOR.

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978,377.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

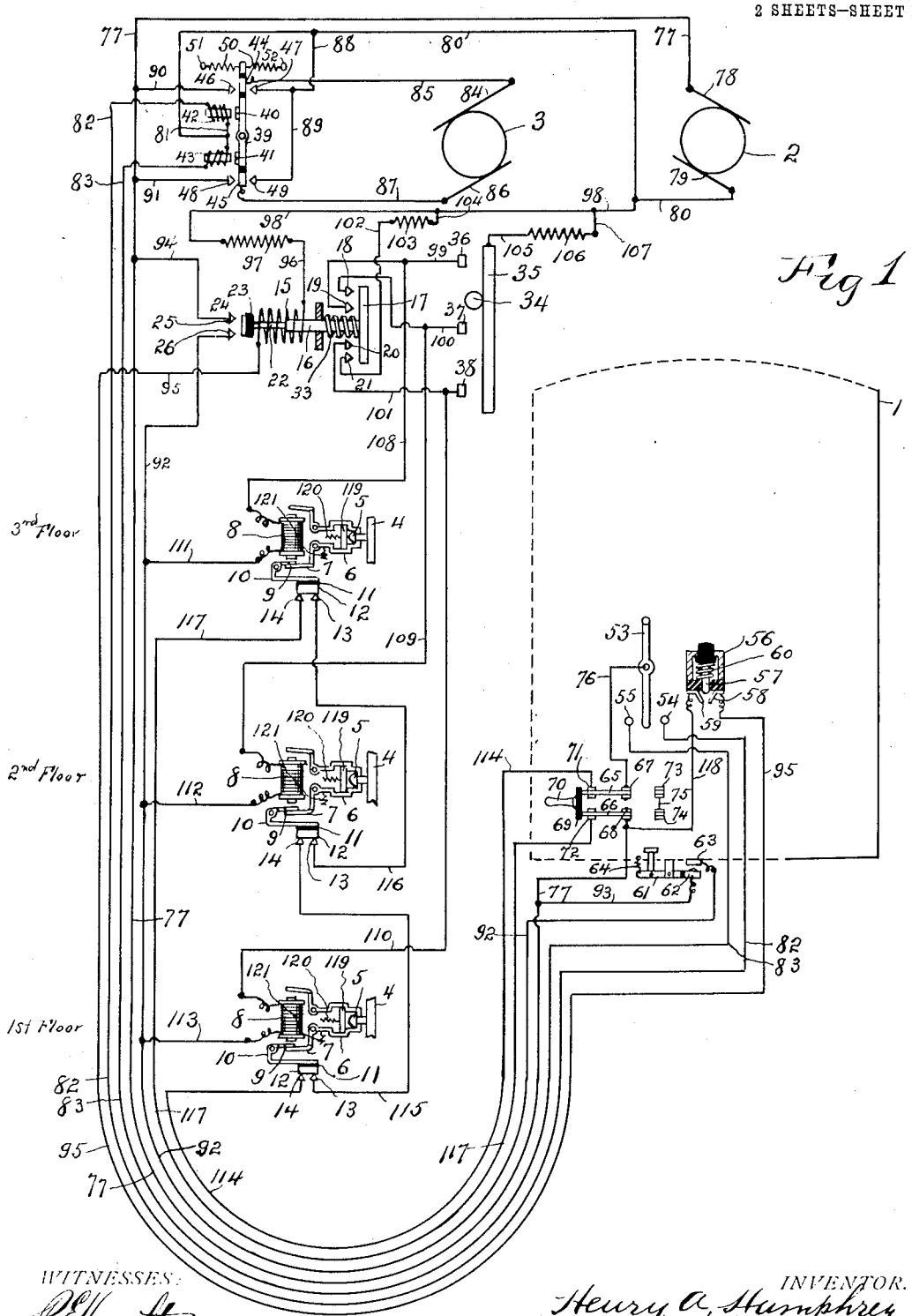

Fig 1

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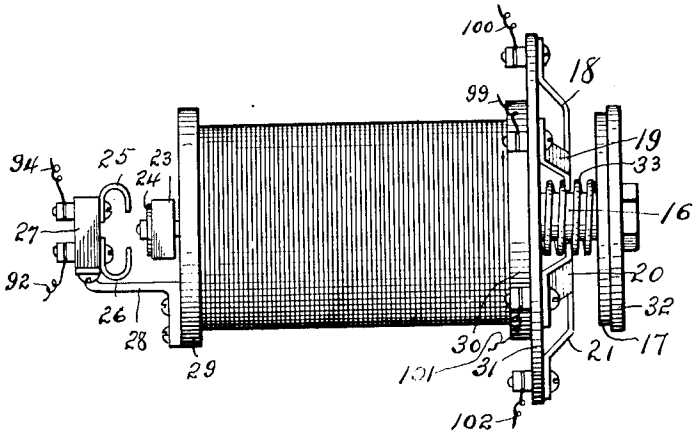


Fig 2

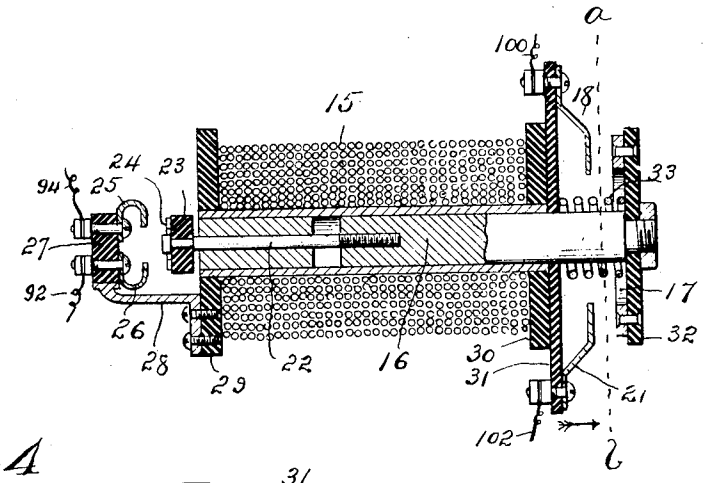


Fig 3

Fig 4

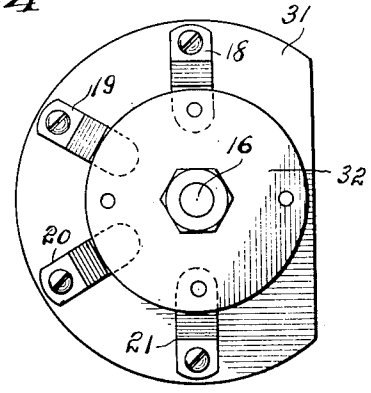
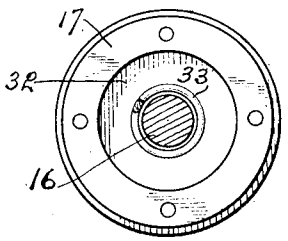


Fig 5



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HENRY A. HUMPHREY, OF KANSAS CITY, MISSOURI, ASSIGNOR TO SAFETY ELEVATOR LOCK AND SIGNAL COMPANY, OF KANSAS CITY, MISSOURI, A CORPORATION OF MISSOURI.

ELEVATOR.

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Application filed June 7, 1910. Serial No. 565,574.

To all whom it may concern:

Be it known that I, HENRY A. HUMPHREY, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to improvements in elevators.

It relates particularly to elevators in which the movement of the car may be controlled by gate locking mechanisms which ordinarily prevent the movement of the car unless the gates are closed.

One object of my invention is to enable the car being moved independently of the gate locking mechanisms, in case such mechanisms become out of repair, or for any other desired reason.

A further object of my invention is to provide means by which any of the gates may be unlocked in case that the elevator car becomes stalled in a position intermediate of any two landings.

Other novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings illustrative of the preferred form of my invention—Figure 1 is a diagrammatic view of the circuits. Fig. 2 is a side elevation, enlarged, of a switch mechanism by means of which the gate locking devices may be operated independently of the movement of the car. Fig. 3 is a longitudinal, central sectional view of what is shown in Fig. 2. Fig. 4 is an end elevation of the switch shown in Figs. 2 and 3. Fig. 5 is a vertical sectional view, taken on the dotted line *a*—*b* of Fig. 3.

Similar characters of reference denote similar parts.

1 denotes the elevator car, 2 an electric generator, such as a dynamo, and 3 an electric motor which is employed to operate the car 1 by the means of a well known mechanism, said motor being in circuit with said generator.

4 denotes elevator gates located at the different floors. Any suitable electrically controlled gate locking mechanisms may be employed for normally holding the gates in closed positions. Any suitable circuit closing means may also be employed for controlling the motor circuit through the intervention of the gate locking mechanisms.

The following is a description of a gate locking mechanism, such as I prefer to employ:—Secured to the gate 4 is a catch 5, adapted to be engaged by a pivoted latch 6, provided with an armature 7, which is disposed in the magnetic field of an electromagnet 8. A circuit controller, controlled by the armature 7, comprises preferably an armature 9, disposed intermediate of the magnet 8 and the armature 7 and secured to a pivoted plate 10, which carries a block of insulating material 11, to which is secured a contact 12. Normally each plate 12 rests upon two contacts 13 and 14, which, as hereinafter described, are in circuit with the motor 3. At each floor is provided such a gate locking mechanism as has just been described. At some suitable place is located an electromagnetically operated switch, consisting preferably of a solenoid comprising a winding 15 and a longitudinally movable core 16, to the outer end of which is secured and supported in any desired manner a contact plate 17, which, when the core 16 is drawn inwardly by the energizing of the winding 15, will strike contacts 18, 19, 20 and 21. Secured to the other end of the core 16 is a horizontal rod 22, to which is secured a block of insulating material, 23, to which is secured a contact plate 24 which, when the core 16 is inwardly drawn, will strike two contacts 25 and 26 so as to close the circuit in which are located the magnets 8. The contacts 25 and 26 are preferably mounted on a block of insulating material 27, which is supported upon a bracket 28, which in turn is secured to the adjacent head 29 of the solenoid spool. To the other head 30 of said spool is secured a block of insulating material 31, on which are mounted the contacts 18, 19, 20 and 21. The contact plate 17 is preferably a ring which is secured to the inner side of a block of insulating material 32, which is secured to the outer end of the core 16. Encircling the core 16 is a coil spring 33, one end of which bears against the plate 31 and the other end of which bears against the block 32. The tension of said spring is such as to normally hold the contact plate 17 separated from the contacts 18, 19, 20 and 21.

34 denotes a contact which is made to move synchronously with the car 1 by any well known mechanism. The contact 34 is in constant contact with a contact plate 35 and is adapted to successively strike con-

tacts 36, 37 and 38, as the car 1 passes downward from floor to floor. The arrangement of the parts is such that when the car is at a landing the movable contact 34 will be in contact with the contact 36, 37, or 38, which corresponds with that landing.

At some suitable place is pivoted a bar 39, to which, at opposite sides of its pivotal point are secured two armatures 40 and 41, respectively located in the fields of two electromagnets 42 and 43. Mounted on the bar 39 and insulated therefrom, are two contacts 44 and 45. The contact 44 is disposed between two contacts 46 and 47. The contact 45 is disposed between two contacts 48 and 49. Two coil springs 50, are secured at one set of ends to the bar 30, the other set of ends being secured to two pins 51 and 52, disposed at opposite sides of the bar 39. The springs 50 normally keep the contact plates 44 and 45 separated from the contacts 46 and 47, and 48 and 49.

On the car 1 is pivoted a controller lever 53, adapted to be swung so as to have contact with either of two contacts 54 and 55, which are mounted on the car 1. On the car 1 is also provided a circuit closer comprising an ordinary push button 56, provided with the contact 57, which is adapted to strike the contacts 58 and 59, a spring 60 normally serving to prevent the contact 57 closing the circuit in which it is located. On the car 1 is also pivoted a lever 61, carrying a contact 62, which is adapted to strike a contact 63, secured to the car floor. A spring 64 normally serves to swing the lever 61 to a position in which the contacts 62 and 63 will be separated, as shown in Fig. 1.

On the car 1 is provided a switch having two plates 65 and 66, which are respectively pivoted to posts 67 and 68, and which have secured to their free ends a block of insulating material 69, to which is secured a handle 70.

71 and 72 denote two contacts adapted to be in contact with the plates 65 and 66 respectively, when the switch is in the position shown in Fig. 1.

73 and 74 are two contacts which are adapted to respectively engage the plates 65 and 66 when said plates are swung to a diametrically opposite position to that shown in Fig. 1.

75 denotes a conductor connecting the contacts 73 and 74.

76 is a conductor which connects the controller lever 53 with the contact post 67.

77 denotes a conductor connected at one end to the contact post 68 and having its other end connected to one brush 78 of the generator 2, the other brush of which, denoted by 79, is connected by a conductor 80, with a conductor 81, opposite ends of which are respectively connected to the windings of the magnets 42 and 43, said windings being respectively connected to conductors 82 and 83, which in turn are respectively connected to the contacts 54 and 55 of the car controller. One brush 84 of the motor 3, is connected by a conductor 85 to the contact 44. The other brush 86 is connected by a conductor 87 to the contact 45. The contact 47 is connected by a conductor 88 to the conductor 80. The contact 49 is connected by a conductor 89 to the conductor 88. Conductors 90 and 91 respectively connect the contacts 46 and 48 with the conductor 77.

A conductor 92 connects the contacts 26 and 63. A conductor 93 connects the contact 62 with the conductor 77. A conductor 94 connects the contact 25 with the conductor 77. A conductor 95 connects one end of the winding 15 with the contact 58. The other end of the winding 15 is connected by a conductor 96 to one end of a resistance coil 97, the other end of which is connected by a conductor 98 with the conductor 80. Conductors 99, 100 and 101 are respectively connected to the contacts 36, 37 and 38, and to the contacts 19, 18, and 20 respectively. The contact 21 is connected by a conductor 102 with one end of a resistance coil 103, the other end of which is connected by a conductor 104 with the conductor 98. The contact plate 35 is connected by a conductor 105 with one end of a resistance coil 106, the other end of which is connected by a conductor 107, with the conductor 98. The conductors 99, 100 and 101 are respectively connected to conductors 108, 109 and 110, which in turn are respectively connected to one set of terminals of the windings of the magnets 8 on the third, second and first floors. The other set of terminals of said magnets are respectively connected by conductors 111, 112 and 113 to the conductor 92. The contact 71 is connected by a conductor 114 with the first floor contact 14. The first floor contact 13 is connected by a conductor 115 to the second floor contact 14. The second floor contact 13 is connected by a conductor 116 with the third floor contact 13. The third floor contact 14 is connected by a conductor 117 with the contact 72. The contact 59 is connected by a conductor 118 with the conductor 77.

In the ordinary operation of my invention assuming that the lever 53 is upon the contact 54, the current from the generator 2 will pass as follows:—from brush 79 through conductors 80 and 81, winding of magnet 42, conductor 82, contact 54, lever 53, conductor 76, contact post 67, plate 65, contact 71, conductor 114, 1st floor contact 14, contacts 12 and 13, conductor 115, 2nd floor contacts 14, 12 and 13, conductor 116, 3rd floor contacts 13, 12 and 14, conductor 117, contact 72, plate 66, contact post 68,

thence by conductor 77 to the brush 78 of generator 2. The magnet 42 being energized will attract armature 40 and swing the bar 39 to a position in which contacts 44 and 45 will be respectively against contacts 46 and 49. Current will then pass through the motor 3 by the following path: from brush 79 through conductors 80, 88 and 89, contacts 49 and 45, conductor 87, brush 86, motor 3, brush 84, conductor 85, contacts 44 and 46, conductors 90 and 77 and brush 78. The motor 3 will thus be actuated to move the car 1 in one direction.

If the lever 53 of the car controller be moved into contact with the contact 55, the current will travel from the generator brush 79 through conductors 80 and 81, winding of magnet 43, conductor 83 and contact 55 to lever 53. From lever 53 the current will return to the generator 2 by the path already described. The magnet 43 being energized will attract the armature 41, thereby swinging the bar 39 to a position in which the contacts 44 and 45 will rest against contacts 47 and 48. The current will then pass through motor 3 by the following path:—brush 79, conductors 80 and 88, contacts 44 and 47, conductor 85, brush 84, motor 3, brush 86, conductor 87, contacts 45 and 48, conductors 91 and 77 and brush 78. The motor 3 will thus be actuated to move the car 1 in the direction opposite to the one already described.

As the car moves upward and downward the moving contact 34 will consecutively strike the contacts 36, 37 and 38. No effect will be produced on the gate locking mechanism, however, unless the operator on the car depresses lever 61, thereby closing the circuit in which are located the magnets 8 which actuate the gate locking mechanisms to release the gates 4 at such times as the contact 34 is on one of the contacts 36, 37 or 38.

Assuming that the contact 34 is on the contact 37, which corresponds to the second floor landing, and assuming that the operator is holding lever 61 depressed, then the current from generator 2 will pass as follows:—from brush 79 through conductors 80, 98, 107, coil 106, conductor 105, contact plate 35, contacts 34 and 37, conductors 100 and 109, winding of magnet 8 on second floor, conductors 112 and 92, contacts 63 and 62, conductors 93 and 77 and brush 78 of generator 2. The second floor magnet 8 being energized will attact the armature 7 and the armature 9 thereby swinging the adjacent latch 6 so as to release the catch 5. The gate 4 at the second floor may now be opened. When the armature 9 was attracted the lever 10 to which it is secured was swung so as to separate the contact 12 from the contacts 13 and 14 at the second floor, thereby breaking the motor circuit. The car 1 can not then be moved until the gate 4 has been closed and the contact lever 10 has been released by magnet 8 and the adjacent armature 7 has been again moved to the position shown in Fig. 1. For holding the 2nd floor latch 6 in the open position until the gate has again been closed I provide a plate 119 which is automatically moved by a spring 120 to a position holding the latch 6 open when the gate 4 is opened. When the gate closes it forces the plate 119 to the original position, at which time a spring 121 will swing the latch 6 to the closed position engaging the catch 5, providing the operator on the car 1 has removed his foot from the lever 61 so as to open the circuit in which the magnets 8 are located. Each locking mechanism is equipped as just described.

From the foregoing it will be understood that in the regular operation of my invention, the gates can be opened when the car is at a landing but at no other time. Sometimes it becomes necessary to open a gate when the car is between landings, as when it becomes stalled for lack of power or for any other reason. At such time it is desirable to be able to open the nearest gate so as to liberate the passengers and operator.

Assuming that the car has become stalled between the 2nd and third floors in the relative position shown by the contacts 34 and 37, as viewed in Fig. 1, the operator on the car operates the push button 56 on the car, thereby forcing the contact 57 against contacts 58 and 59. Current will then pass from generator 2 by brush 79, conductors 80 and 98, resistance coil 97, conductor 96, winding 15, conductor 95, contacts 58, 57 and 59, conductors 118 and 77 and brush 78. The winding 15 being energized, the core 16 will be drawn therein, thus causing the contact plate 17 to strike contacts 18, 19, 20 and 21. At the same time the plate 24 will be forced against the contacts 25 and 26. Current will now pass from brush 79 through conductors 80, 98, 104, resistance coil 103, conductor 102 and contact 21 to contact plate 17 from which the current will pass through the different magnets 8 to conductor 92 by the following described paths. Starting at plate 17 the current passes through contact 19, conductors 99 and 108, 3rd floor magnet 8, conductors 111 and 92, contacts 26, 24 and 25, conductors 94 and 77 and brush 78. From plate 17 the current will pass through contact 18, conductors 100 and 109, second floor magnet 8, and conductor 112 to conductor 92, thence by the path already described to brush 78 of the generator. From plate 17 the current will pass through contact 20, conductors 101 and 110, 1st floor magnet 8 and conductor 113 to conductor 92, and thence as described to brush 78.

From the above description it will be seen

that when the push button 56 is operated all the magnets 8 will be energized and the gates will all be unlocked, thus permitting the imprisoned passengers and operator to open the nearest or most accessible gate for the purpose of egress from the car.

It is often desirable to operate the car independently of the gate locking mechanisms, that is without regard as to whether or not the circuits through the contacts 12, 13 and 14 of the different locking mechanisms are open or closed. To do this the switch handle 70 on the car 1 is swung so as to separate the plates 65 and 66 from the contacts 71 and 72 and to bring said plates respectively in contact with the contacts 73 and 74. This being done the contacts 12, 13 and 14 at the different floors will be in open circuit. The current will now pass from the brush 79 of generator 2 to controller lever 53 by one or the other of the two paths already described which respectively include the contacts 54 and 55. From the lever 53 the current will pass by conductor 76, contact post 67, plate 65, contact 73, conductor 75, contact 74, plate 66, contact post 68, conductor 77 and brush 78. The car may thus be operated freely without having the opening or closing of the gates affect the motor circuit. At the same time the operation of the gate locking mechanisms is carried on in the normal manner, excepting that the contacts 12, 13 and 14 being in open circuit the motor circuit is not controlled by the positions of said contacts.

Many modifications of my invention, within the scope of the appended claims, may be made without departing from its spirit.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means for controlling the gate locking means, means operative synchronously with the car for controlling said electric means, means operative independently of said synchronously operative means for controlling the operation of said electric means, and means controlled by the gate locking means for controlling the motor circuit.

2. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means for controlling the gate locking means, means operative synchronously with the car for controlling said electric means, a switch in circuit with said electric means, electromagnetic means controlling the operation of said switch independently of said synchronously operative means, means carried by the car for controlling the operation of said electromagnetic means, and means controlled by the gate locking means for controlling the motor circuit.

3. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means for controlling the gate locking means, means operative synchronously with the car for controlling said electric means, a switch in circuit with said electric means, electromagnetic means for moving the switch to the closed position, means for normally forcing the switch to the open position, a circuit closer on the car in circuit with the electromagnetic means, and means controlled by the gate locking means for controlling the motor circuit.

4. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means for controlling the gate locking means, means operative synchronously with the car for controlling said electric means, a switch in circuit with said electric means, electromagnetic means for moving the switch to the closed position, a spring for moving the switch to the open position, a circuit closer in circuit with said electromagnetic means, and means controlled by the gate locking means for controlling the motor circuit.

5. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means for controlling the gate locking means, means operative synchronously with the car for controlling said electric means, a switch in circuit with said electric means, electromagnetic means for moving the switch to the closed position, a spring for moving the switch to the open position, a circuit closer carried by the car and in circuit with said electromagnetic means, and means controlled by the gate locking means for controlling the motor circuit.

6. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, means controlled by the gate locking means for controlling the motor circuit, and means for controlling the motor circuit independently of said locking means.

7. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means controlling the gate locking means, means controlled by the gate locking means for controlling the motor circuit, and means carried by the car by which the motor circuit may be controlled independently of said circuit controlling means.

8. In elevators, the combination with a car, of a motor in an electric circuit for operating the car, gate locking means, electric means controlling the gate locking means, means controlled by the gate locking means

for controlling the motor circuit, and a switch carried by the car and in circuit with the motor and with said circuit controlling means for controlling the motor circuit independently of said circuit controlling means.

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

HENRY A. HUMPHREY.

Witnesses:
E. B. HOUSE,
CHESTER THOMAS.