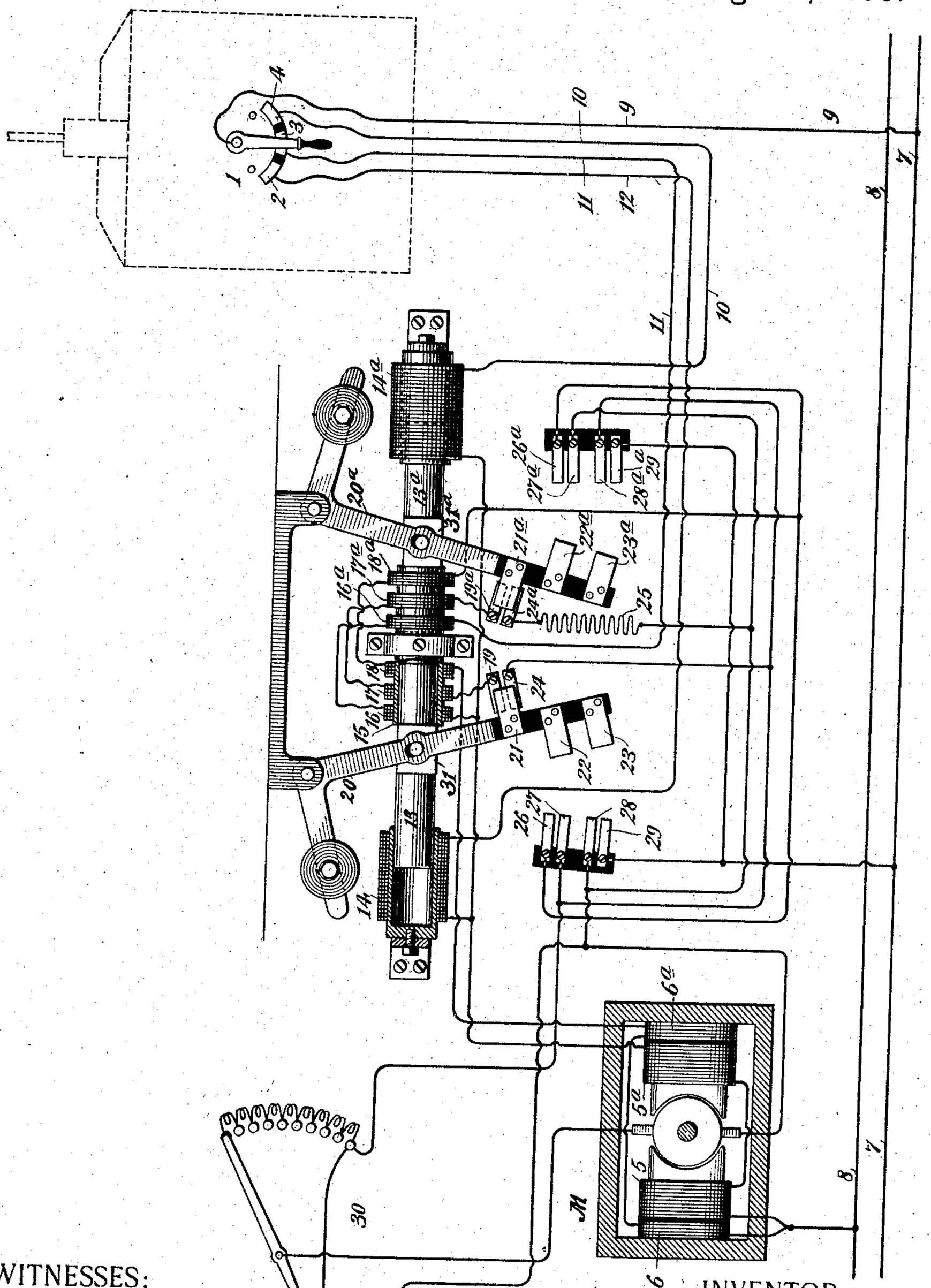
(No Model.)

N. O. LINDSTROM.

ELECTRIC ELEVATOR.

No. 544,768. Patented Aug. 20, 1895.



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ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 544,768, dated August 20, 1895.

Application filed May 16, 1895. Serial No. 549,492. (No model.)

To all whom it may concern:

Be it known that I, NILS O. LINDSTROM, a citizen of the United States, residing in Union Course, in the county of Queens and State of New York, have invented certain new and useful Improvements in Electric Elevators, of which the following is a specification.

This invention relates to electrically-operated elevators.

The objects of the invention are to simplify the construction of the switching apparatus controlling the direction of rotation of the driving electric motor, to render its action reliable, to utilize the motor as a brake for slowing down the elevator in stopping, and to prevent the attendant from suddenly changing the direction of travel.

To these ends my invention comprises an electric switch carried by the car, and a current-reverser and controller located at or near the motor, by which the field-magnet is normally kept charged ready for instant action and adapted to close the armature-circuit on itself when the switch is shifted to a stopping position, thus causing the motor to act as a magnetic brake and smoothly and powerfully reduce the speed of travel of the car. The continuously-closed circuit which maintains the field-magnet charge also acts magnetically on the controller to hold it forcibly in a position in which the armature-circuit is open until by a suitable change of the car-switch it is permitted to change position and start up the motor.

The several features of novelty of the invention will be hereinafter more fully described and will be definitely indicated in the claims appended to this specification.

In the accompanying drawing, which diagrammatically illustrates the invention, is shown a system embodying my improvements.

Upon the elevator-car is a switch 1, comprising a pivoted metallic hand-lever provided with three co-operating contacts 2 3 4, preferably arranged in an arc of a circle over which the lever sweeps. The car is indicated in dotted lines and the hoisting-cable and its winding-drum have been omitted for clearness and simplicity.

M indicates the driving electric motor provided with two field-magnet windings 5 5ª and 6 6ª, the former of which is always in circuit and the latter of which is only in circuit when the armature is closed on the supply-circuit. The contacts 2 3 4 of the car-switch are insulated from one another and so arranged that the switch-lever in passing from 3 to 2 or 4 will not break the field-magnet circuit. The switch-lever is normally in the position shown in the drawing, bearing on the contact 3. The lever is connected with one side of a supply-circuit 7 8. Conductors 9 10 11 12, leading from the car-switch to the controller and supply-circuit, are grouped in a cable adapted to follow the movements of the car.

13 13ª represent solenoid-cores, each co-operating with solenoid-coils by which their movement is controlled. As shown, they are mounted to slide in tubular bearings formed of non-magnetic and preferably non-conducting material—such as wood, paper, or indurated fiber—suitably supported upon a framework or wall. The bearings are provided with plugs of iron to produce a firm grip on the solenoid-cores when at either extreme of movement.

14 14ª represent solenoids to control closure of the armature-circuit, and connecting with contacts 2 and 4, respectively, of the car-switch on one side, and with the field-magnet coil 5 5ª on the other side. The shell 15 is provided at or near its middle with a plug of iron, (indicated,) against which the cores 13 13ª bear when the motor is cut out of circuit. The cores 13 13ª, are compound in character, being magnetically insulated at the middle point by a section 31 31ª, of brass or other non-magnetic material, to permit the two iron sections of each core to be separately magnetized. Around the shell is placed three coils or groups of coils 16 16ª, 17 17ª, 18 18ª, the first set being in the normally-closed field-magnet circuit, the second set, with contacts 19 19ª, adapted to be closed on the armature-brushes when the motor is open-circuited, and the last set in series with the motor when operating.

20 20ª are pivoted arms or levers, which may be counterweighted, as shown, or spring-actuated. These levers are arranged for co-operation with the cores 13 13ª—as, for example, by being loosely pivoted thereto, as shown. Each lever carries insulated metallic brushes

21, 22, 23, &c. Brushes 21 21ª co-operate with contact-strips 19, 24, 19ª, and 24ª. Contact-strips 24 24ª are electrically connected with the armature-brushes, a suitable resistance 25 being interposed in one branch. Brushes 22 and 23 co-operate with pairs of contact-strips 26 27, 28 29, one strip of each pair connecting with the respective armature-brushes and the other with the respective supply-wires. The brushes 21ª, &c., and their co-operating contacts are similarly arranged, except that strips 27 and 28 are reversely connected to the armature-brushes compared with 27ª 28ª.

As thus organized, the operation of the apparatus is as follows: The field-magnet coils 5 5ª and the solenoid-coils 16 16ª of the controller are normally charged, current flowing from one direct-current main 7 over conductor 9, switch-lever, contact 3, conductor 11, coils 16 16ª, and field-magnet coils 5 5ª to the opposite main 8. This results in several important functions: First, it keeps the field-magnet charged and yields a high instantaneous counter-electromotive force in the motor when the armature is cut into circuit; second, it permits the motor to act as a brake in stopping by reason of the charged field, and, third, it operates the controller to cut off the supply of current from the mains to the armature and positively holds the controller in such position until the switch-lever in the car is actuated. When the attendant desires to start the car, he operates the hand-switch so as to connect with contact 2 or 4, one of which determines ascending and the other descending motion. If contact 2 be energized, solenoid 14 is rendered active, the integrity of the field-magnet being constantly preserved. The solenoid draws in core 13 and throws the controller-switch, bringing brushes 22 23 into engagement with contact-strips 26 and 27 and 28 29, respectively. Current is thereby thrown into the armature at its lower brush from main 7, contact-strips 29 28, armature-coils, rheostat 30, contact-strips 27 26, controller-coils 18ª 18, series field-magnet coil 6ª 6 to opposite main 8. The series-coil 6 6ª consists of a few turns of coarse wire wound in a direction to increase the action of the shunt-coil 5 5ª in producing a strong starting-torque. If an opposite direction of car-travel be desired, contact 4 will be energized by the car-attendant, thus energizing solenoid 14ª of the controller and reversing the armature-circuit by cutting in contact-strips 26ª 27ª, &c., which lead current through the armature by way of its upper brush. It will be noted that when the motor is running in either direction—that is to say, when its armature is drawing current from the mains—controller-coils 18 18ª are energized and therefore lock the idle side of the controller. This construction also prevents a sudden reversal of the motor by a quick throw of the hand-switch by the car-attendant, for if said switch be quickly thrown from, say, contact 2 to contact 4 core 13ª cannot be shifted by its solenoid 14ª until the motor has smoothly stopped, for after de-energizing coil 14 core 13 is shifted by its counterweight and puts the motor-armature on closed circuit through contacts 19 24 and coils 17 17ª, the motor then acting as a generator, and the latter coils magnetically lock core 13ª until the car and the motor have stopped, when current ceases in the closed local circuit and core 13ª is free to obey solenoid 14ª and reverses the circuit by throwing brushes 22ª 23ª upon contacts 26ª 27ª 28ª 29ª. It will be seen that when the circuit is opened by the attendant the field-magnet is energized by coils 5 5ª and a closed local circuit for the armature is made through resistance 25. The motor thus becomes a very effective brake for stopping or slowing down the car.

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

1. An electric elevator comprising a car, a driving electric motor, a switch on the car for controlling its direction of travel, and means for placing the motor on closed circuit and maintaining its field-magnet charged after the switch has been operated to cut it out of circuit.

2. An electric elevator comprising a car, a driving electric motor, a circuit-controller for reversing the motor circuits, and a switch on the car and connections for normally maintaining the motor field-magnet charged.

3. An electric elevator comprising a car, a driving electric motor, a magnetically operated circuit-controller for reversing the armature circuit, a switch on the car, connections for maintaining the motor field-magnet constantly charged, and a switch operated by the controller for placing the motor armature on closed circuit when the motor is cut out.

4. An electric elevator comprising a car, a driving electric motor, a magnetically operated circuit-controller for reversing the motor, a switch on the car for operating the controller, and means for magnetically locking the controller against a sudden reversing movement.

5. An electric elevator comprising a car, a driving electric motor, two independently actuated circuit-controlling switches, a switch on the car for operating either circuit-controlling device, and means for magnetically locking one circuit-controlling device while the other connects the motor in circuit.

6. An electric elevator comprising a car, a driving electric motor, a circuit-controller for reversing the armature circuit, independent coils for shifting the circuit-controller, each coil being in series with the field-magnet, and a car-switch normally completing the field-magnet circuit and adapted to cut in either controller-coil.

7. An electric elevator comprising a car, a driving electric motor, a circuit-controller at or near the motor, solenoids 14, 14ª, a car-switch for cutting in either solenoid, and lock-

ing coils 18, 18ª in circuit when the motor is operating, cooperating with the solenoid cores when in their normal position.

8. An electric elevator comprising a car, a driving electric motor, a circuit-controller at or near the motor, solenoids 14, 14ª, a car-switch for cutting in either solenoid, locking coils 17, 17ª in circuit when the motor is cut out and cooperating with the solenoid cores when in their normal position.

9. An electric elevator comprising a car, a driving electric motor, a normally charged field-magnet coil and an auxiliary field-magnet coil wound to assist the main coil, said auxiliary coil being cut into circuit when the motor starts into operation.

10. An electric elevator comprising a car, a driving electric motor, a circuit-controller at or near the motor, solenoids 14, 14ª, controller-switches operated by the cores of the solenoids, a retractile agency to normally hold the switches open, and auxiliary coils for magnetically locking either of the solenoid cores.

11. A controller comprising two compound cores 13, 13ª having their members magnetically insulated from each other, solenoid coils 14, 14ª cooperating with one member, and auxiliary solenoids cooperating with the other member.

In testimony whereof I have hereunto subscribed my name this 10th day of May, A. D. 1895.

NILS O. LINDSTROM.

Witnesses:
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