(No Model.)

F. A. PERRET.

ELECTRIC ELEVATOR.

No. 510,932. Patented Dec. 19, 1893.

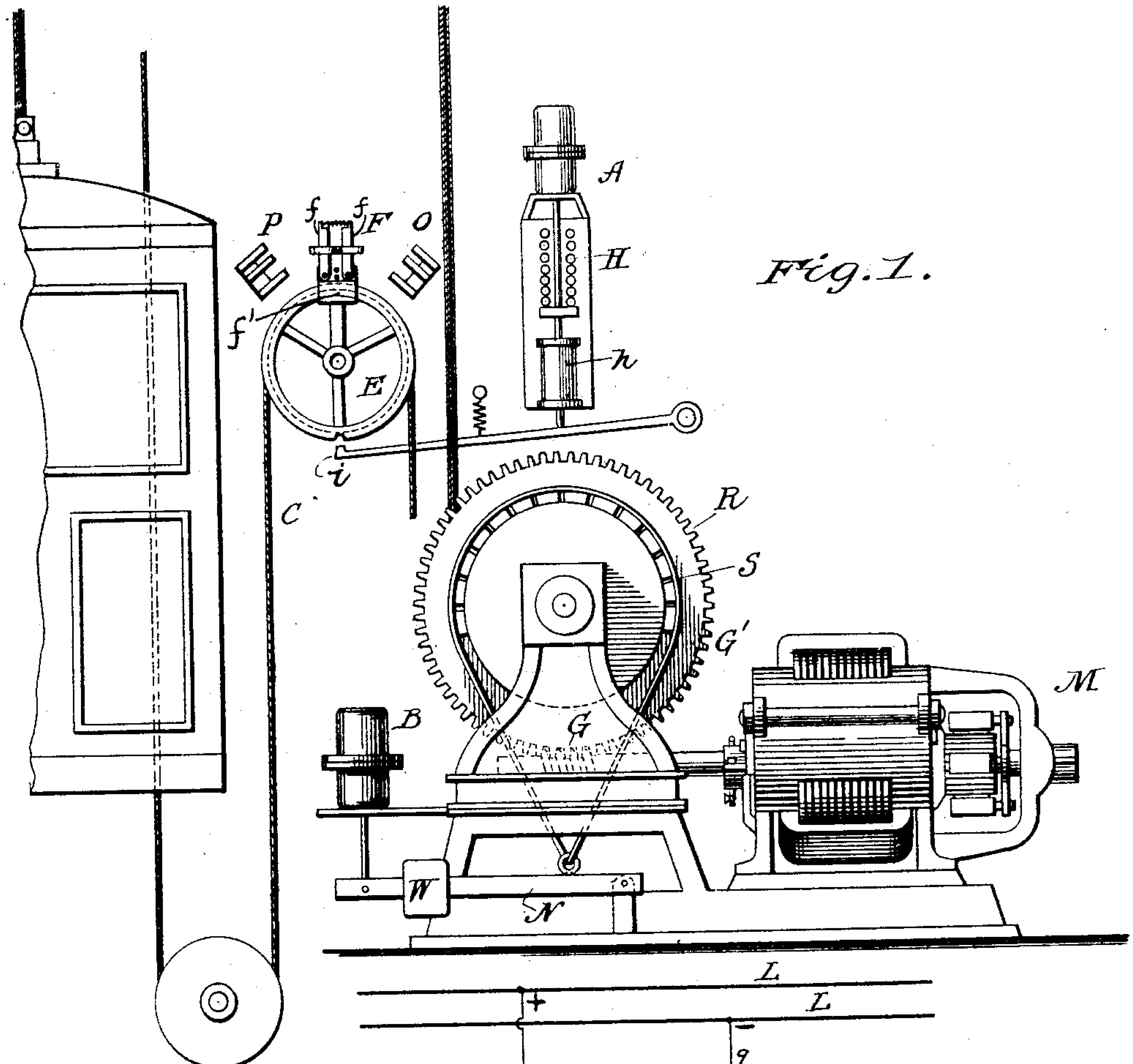

Fig. 1.

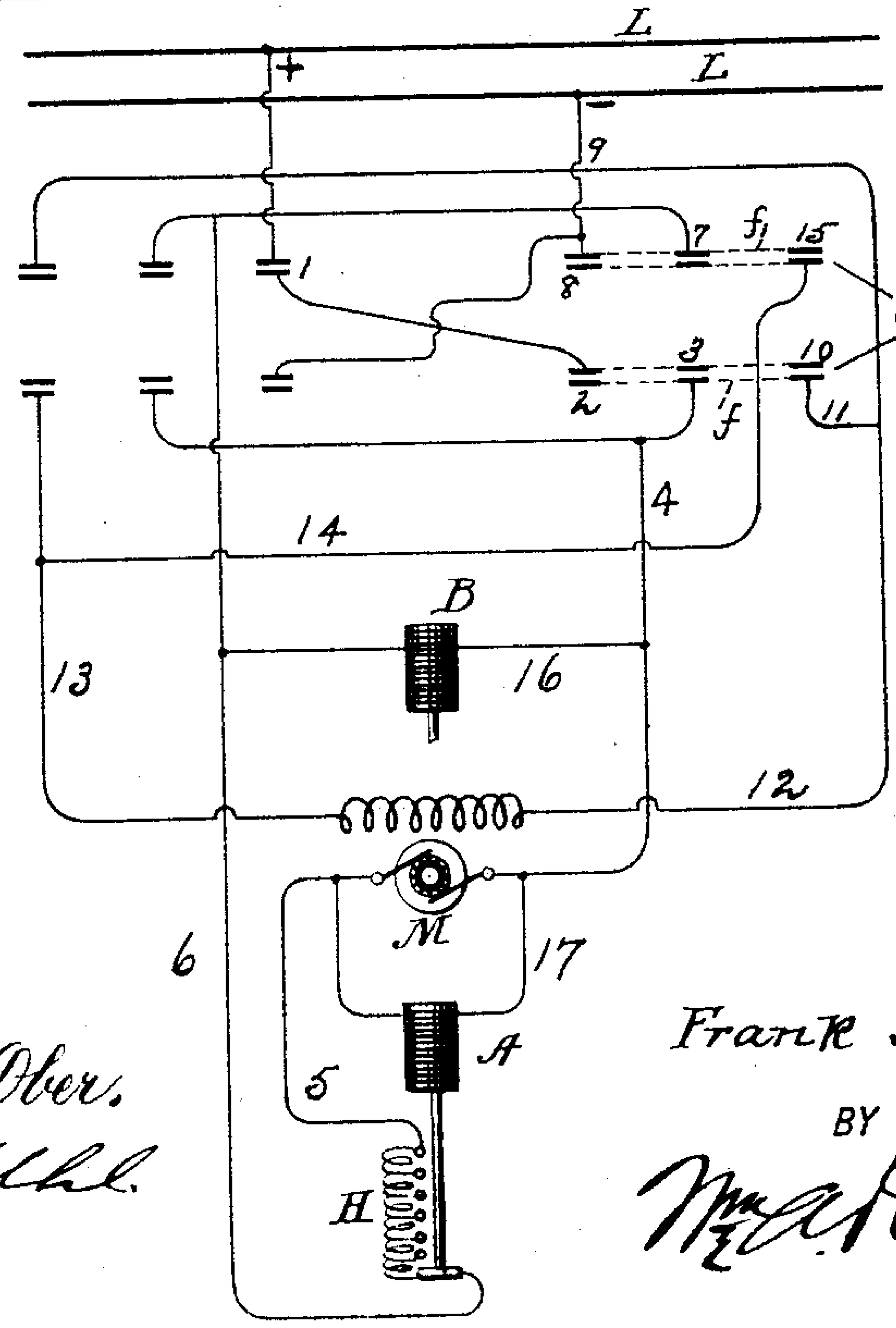

Fig. 2.

WITNESSES:
Frank S. Ober.
Jos. J. Uhl.

INVENTOR
Frank A. Perret
BY
Wm. A. Rosenbaum
ATTORNEY.

THE NATIONAL LITHOGRAPHING COMPANY, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANK A. PERRET, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE ELEKTRON MANUFACTURING COMPANY, OF NEW YORK.

ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 510,932, dated December 19, 1893.

Application filed November 12, 1892. Serial No. 451,745. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. PERRET, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Elevators, of which the following is a full, clear, and exact description.

This invention relates chiefly to that class of elevators, in which a platform or car is caused to ascend or descend by means of cables attached thereto, which pass over a pulley or drum at the top of the shaft and thence around a winding drum, which may be located on any floor. Such elevators may be divided into two classes: first, those in which the speed of hoisting or lowering may be varied at will by the operator in the car, this feature being essential in high speed passenger elevators, as it is necessary to slow down just before reaching a landing in order to make an accurate stop at the landing, and, second, those elevators in which the speed of the car is practically constant in both hoisting and lowering or is independent of the control of the operator on the car who simply has the power to start the car either up or down and to stop same. This invention relates to the latter class. Until recently in nearly all elevators of this class the winding drums were driven by belts from a constant source of power, the arrangement being such that when the elevator is not in use the belt runs on a loose pulley. When the operator desired to go up he pulls the rope passing through the car in one direction which shifts the belt to a tight pulley; pulling the rope back shifts it back to the loose pulley and stops the car; pulling it in the opposite direction shifts another belt onto the tight pulley which moves the car in the opposite direction. Electric motors have been used in many cases as the sources of power and connected thus by belts to the elevators, in which case the motor is usually allowed to run constantly, which is wasteful of current, or the attendant has to go to a line switch and shut off the current to stop it, which is inconvenient. In order to avoid these objections, motors have been coupled direct to the elevator machine and switching devices have been connected to the usual operating cord by means of which the motor is stopped, started and reversed.

The invention herein described is concerned with the starting devices for the electric motor, and, although the description refers to it in connection with an electric elevator, it is well adapted as a motor starter wherever motors are used, especially for railway motors.

In the accompanying drawings: Figure 1 represents a general view of the apparatus as applied to an elevator, and Fig. 2 is a diagram of the circuits.

Referring to the drawings by letter, M is an electric motor which I prefer to be shunt wound and which is connected to constant potential mains, L L. I have shown the motor operatively connected to the winding drum, R of an elevator by a worm G, and a gear wheel G′, but the invention is equally applicable to a spur gear or to a belt connection. S is the brake, which is applied by means of the weight W, which is adjustable on the lever N. This lever may be lifted and the brake released in the old fashioned way by means of a mechanical device connected with the sheave wheel E, around which the operating cable C passes, but I prefer to lift the lever N, and release the brake by means of an electro-magnet or solenoid B, which is connected in the armature circuit or preferably in shunt as shown in the diagram. As soon as the current is admitted to the coils of this solenoid it sucks in its armature, raises the lever N, and releases the brake. The instant the circuit is opened at any point, by any means, the solenoid is de-energized, and the weight W drops and applies the brake. F is a reversing switch, which is preferably actuated by a sheave wheel over which the operating cable passes. I prefer that the movable portion of this switch should be mounted upon the sheave wheel while the two sets of clips O and P, with which it makes contact, are stationary. Fig. 1 shows this switch at its central position, at which point both armature and field circuits are open. A pull on the cable in one direction closes both field and armature circuits and causes rotation of the drum in one direction. A pull on the cable in the other direction closes both field and armature circuits and, as the armature circuit is reversed, produces rotation in the opposite direction. Each set of the clips of this switch consists of six contact points, three being arranged on each side of a block of insulating material, and there will be four metallic blades *f* pivoted to a block of insulating material *f'* carried by the sheave. Two of these blades are supposed to be directly behind the two shown in Fig. 1. The two blades standing to the right are adapted to make contact with the six clips O, one blade connecting three clips and the other blade the other three clips. The same arrangement occurs on the left hand side.

H is a rheostat which is connected in the armature circuit. The diagram shows the brush on the lowest contacts at which points all the resistance is in circuit, and there should be sufficient resistance to protect the armature when at rest from a current in excess of its safe carrying capacity. The contact brush of this rheostat is attached to the armature of the solenoid A, which is connected in a direct shunt to the brushes of the motor, the resistance H being outside of the terminals of the shunt. Hence little or no current will flow through the solenoid until the armature commences to turn and to generate a counter-electro-motive force. Then the current in the solenoid will increase in proportion to the increase of counter-electro-motive force generated by the armature and will not be affected in any way by the condition of the rheostat. The solenoid therefore is controlled entirely and only by the difference of potential between the positive and negative sides of the motor armature.

We will now suppose the switch F to be open, as shown, and that the operator pulls the cable to start the mechanism. This closes the switch F, and the circuit is at once made through the field magnets and armature of the motor, the rheostat H, its solenoid A, and the brake solenoid B. The circuits are traced as follows: Referring to Fig. 2, the dotted lines indicate the two right hand blades *f* thrown into contact with the two groups O of three clips each. When the switch is in this position the current is led from the positive line to clip 1, thence to clip 2, along the switch blade to clip 3, thence by wire 4 through the armature of the motor, wire 5, rheostat H, wire 6, clip 7, switch blade, clip 8, wire 9 to the negative main. The field magnetic circuit branches at clip 3 and is led through the switch blade to clip 10, thence by wire 11, wire 12, through the field magnet, wire 13, wire 14, clip 15, and joins the armature circuit at clip 7. The brake solenoid B is connected in wire 16 across the armature and outside of the rheostat H. The controlling solenoid A is in circuit 17 directly across the brushes of the motor. The brake solenoid instantly attracts the armature, raises the weight W, and releases the brake. Unless there is an excessive load on the car the armature will commence at once to revolve, will accelerate rapidly, the counter-electro-motive force generated by it will increase and the current through the solenoid A will increase correspondingly, causing it to draw up its armature with increasing power thereby moving the contact brush across the row of contacts on the rheostat, and cutting out resistance step by step until it reaches the top where the resistance is all out, and the motor is running at full speed.

In case there should be an excessive load on the car or it is prevented from moving freely, the current, which is at first admitted to the armature through the rheostat, will not start the motor; consequently, the solenoid A, will receive practically no current, and will not attract its armature with sufficient power to move the contact brush on the rheostat. Consequently, no resistance will be cut out. The operator seeing that the motor does not start, will open his switch, and will hunt up the trouble, or if it is overloaded will ask somebody to step out.

The solenoid will work against gravity, preferably, so that the weight of its armature will resist the small pull of the coil due to the little current which may flow through it while the motor armature is stationary; or a spring may be used to accomplish the same thing. *h* represents a dash pot or air cushion of any suitable construction, used, if necessary, to prevent the too rapid movement of the solenoid armature.

We will now suppose the mechanism to have been put into operation as already described, and that a stop is to be made. The operator pulls the cord until the switch reaches the central point where a stop *i* will prevent its going farther, until the contact brush of the rheostat has dropped again to the bottom and all the resistance is in circuit. This stop is held against the periphery of the switch wheel while the motor is running, but when the wheel is moved to the middle position to stop the motor, it falls into the notch and locks the wheel until it is removed therefrom by the end of the resistance controlling arm when it reaches the point where all the resistance is in circuit. This prevents reversing until the resistance is put in. As soon as the circuit has been broken at the switch F as just described, the solenoid B is de-energized and the brake is applied. It will be seen that this principle of controlling the starting of the motor by the counter-electro-motive force generated by the motor armature is applicable to motors driving railway cars or any other apparatus and is a sure protection to the motor.

Having described my invention, I claim—

1. An electric motor having a main or armature circuit and a shunt or field circuit, and a rheostat in the armature circuit, in combination with a third circuit including an electro-responsive apparatus controlling the rheostat, said third circuit being a direct

shunt to the brushes of the motor, substantially as described.

2. The combination, of an electric motor and its circuit, an electric switch controlling said circuit, a locking device for said switch when in its "open" position, a rheostat in the motor circuit and an electro responsive apparatus operating the rheostat and the said locking device substantially as and for the purpose set forth.

In testimony whereof I subscribe my signature in presence of two witnesses.

FRANK A. PERRET.

Witnesses:
WM. A. ROSENBAUM,
JOS. J. UHL.