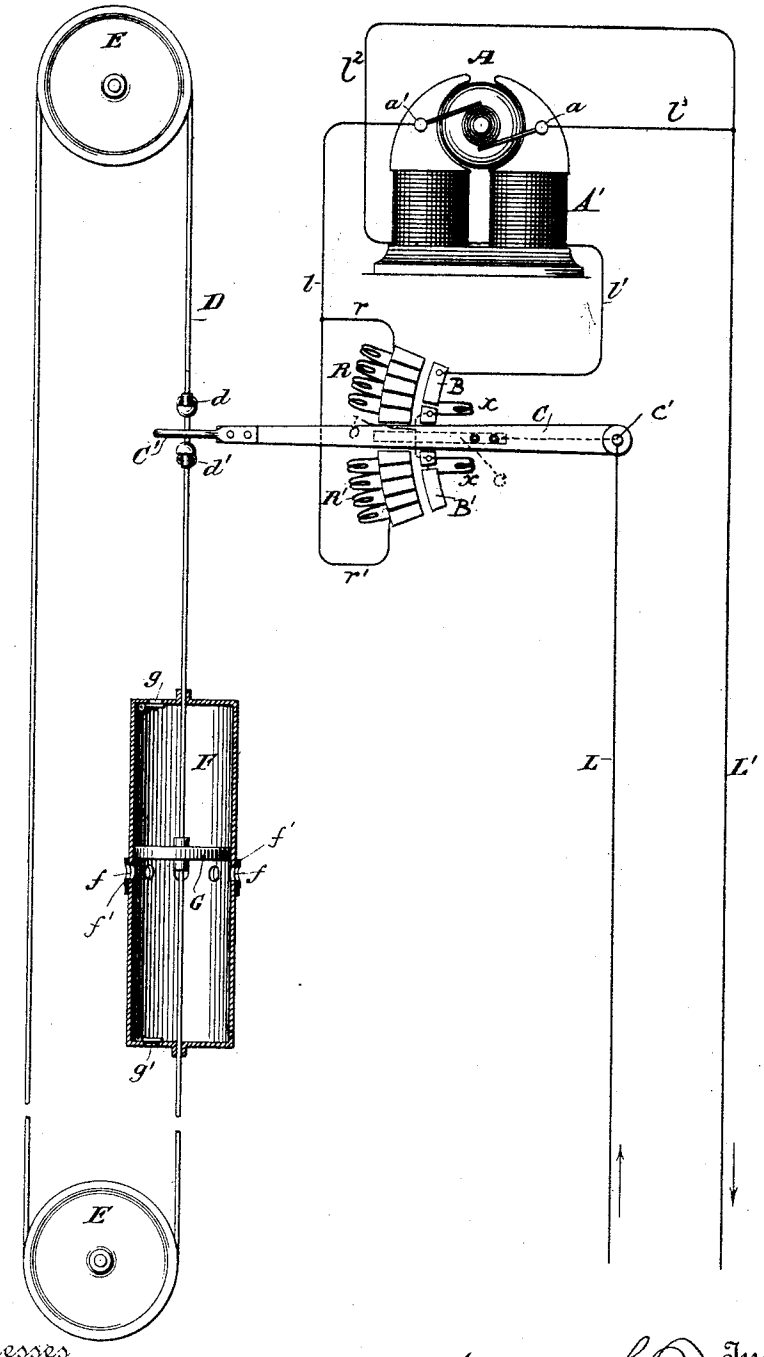
(No Model.)

A. L. PARCELLE.

DEVICE FOR CONTROLLING ELECTRIC MOTORS.

No. 469,712. Patented Mar. 1, 1892.



Witnesses
Geo. W. Breck
Edward Thorpe

Inventor
Albert L. Parcelle,
By his Attorneys
Baldwin Davidson & Wright

UNITED STATES PATENT OFFICE.

ALBERT L. PARCELLE, OF BOSTON, MASSACHUSETTS.

DEVICE FOR CONTROLLING ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 469,712, dated March 1, 1892.

Application filed March 14, 1891. Serial No. 385,004. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. PARCELLE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Devices for Controlling Electric Motors, of which the following is a specification.

The injurious effect of suddenly throwing the full current of an electric motor upon its armature-coils before the motor has had time to develop a counter electro-motive force is well understood, and attempts have heretofore been made to obviate this danger by various devices.

My invention more especially relates to that class of electric-motor circuit-controlling devices in which the circuit is closed through a gradually-decreasing resistance, which affords the time necessary to develop the proper conditions to prevent burning out or injuring the motor.

Its object is to provide simple and effective apparatus adapted for use by careless and inexperienced operators, by which the circuit may be closed quickly through the field-coils to energize the field and at the same time gradually admitted to the armature-coils as the proper counter electro-motive force is being developed, and both circuits may be simultaneously opened to stop the motor.

In order to carry out my invention, I connect one of the main conductors with a circuit-controlling switch in circuit with one terminal of the field-coils of an electric motor and with a rheostat or series of resistance-contacts connected with one terminal of the armature-circuit of the motor, the opposite terminals being connected with the other main conductor. The field and its contacts and the armature and its rheostat are consequently in branch or derived circuits of the main line and are both controlled by a single movement of the same switch. Such a switch may readily be made double-acting by arranging duplex contacts and resistances on opposite sides of a switch-lever, which normally lies inactive between them, but may readily be moved in either direction to open or close the circuit.

In applying this invention to an elevator or other apparatus the movement of the rope in either direction would be caused to control the driving devices to determine the direction of movement of the elevator either up or down.

My improvements consist in certain novel organizations of instrumentalities hereinafter specified. Unless otherwise indicated, the parts are of ordinary construction.

My improved apparatus is in this instance shown as applied to the operation of an elevator.

The accompanying drawing is a diagrammatic view of so much of the apparatus as is essential to the illustration of the invention.

Some of my improvements may be used without the others, and in apparatus differing in details of construction from that herein shown such details, unless otherwise indicated, constitute no part of my invention and may be varied in many well-known ways without departing from the spirit or principle of the invention.

A main conductor L leads from a suitable generator (not shown) to a contact-finger *c*, carried by a switch arm or lever C, swinging around a pivot *c'* at one end. This lever is preferably insulated or is of insulating material. The switch shown is a double-acting one and will be so described—that is, the contact-finger works over a series of rheostat-contacts on each side of its normal central position. It would, however, work efficiently were one of these divisions or series removed and the circuits correspondingly changed, as will be well understood. The drawing accordingly shows two contact-plates B B' a short distance apart with the contact-finger lying centrally between them in its normal position. Two corresponding sets of resistances and contacts constituting rheostats R R' also lie on opposite sides of the contact-finger *c*, near the contact-plates B B'. In order to reduce the spark when the field-coil circuit is opened either at the plate B or B', these plates are each made in sections, the small section nearest the lever being connected to the larger section through a resistance-coil *x*, as shown. The two adjacent smaller sections of the plates are connected by a conductor *b*. This contact-finger slides over the contact-plates and rheostat-contacts as the switch-arm is moved to one side or the other of its central or neutral position and thus closes the circuit through them both simul-

taneously. The contact-plates B B′ are connected by a branch wire l' with one terminal of the field-coils A′ of the motor, the other terminal of which coils is connected by a branch wire l^2 with the other side of the circuit L′. The outer resistances of each rheostat R R′ are connected by wires r r' with another branch l of the main conductor L, which branch leads to one brush a' of the armature A. The opposite brush a is connected by wire l^3 with the conductor L.

From the foregoing description it will be seen that the contact-plates and field-coils and rheostats and armature-brushes are in branch or derived circuits of the main line and that three wires are sufficient for the circuit instead of the four usually employed. The free end of the switch-arm carries an eye or loop C′, through which an actuating-rope D passes. Stops d d' on opposite sides of this eye control the movements of the switch-arm. This rope is shown as encircling pulleys E, as passing through a cylinder or air-chamber F, and as carrying a piston G, adapted to traverse and fit loosely in the chamber. Each end of the chamber is provided with an inwardly-opening flap-valve and its center with a series of air-holes f. The area of the inlet-valves and central openings may be rendered adjustable in various well-known ways—as, for instance, by a perforated band f', turning on the cylinder. One of the pulleys E controls the elevator-operating mechanism. (Not shown.)

The operation of the apparatus will readily be perceived from the foregoing description. The switch-arm C normally stands out of contact and the circuit is open. As it moves over the contacts the contact-finger c bears both on one of the contact-plates B B′ and on the first contact of its corresponding rheostat R R′. The current is consequently promptly admitted to the field-coils to energize them, while the armature-current is turned on first through the maximum resistance and gradually diminishes as the resistances are successively cut out by the movement of the switch-arm, thus giving time for the excitation of sufficient counter electro-motive force in the armature to prevent the burning out or injury of its coils. The initial pull on the rope in starting shifts the elevator-driving mechanism to determine the direction of movement of the elevator, and at the same time current is supplied to the motor. This is all necessarily done gradually as the piston under the organization shown is moving toward one end of its cylinder, and its speed is regulated by the escape of the air compressed by this movement. The return or shut-off stroke is, however, quickly made, as the air then escapes freely at f.

When shunt-wound motors are used, the stops d d' may be so adjusted that the contact-finger will be left when in normal position upon the first section of plate B or B′ and first contact of rheostat R or R′, so that the motor may be kept running slowly, and upon the actuation of the lever toward the opposite plate and rheostat the circuit, though broken, would be so quickly closed as not to cause the stoppage or slacking of the speed of the motor.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of a main electric circuit, a double-acting contact-finger therein, duplex contact-plates, one on each side of the central position of said finger, in a branch circuit including the field-coils of an electric motor, and a duplex rheostat, one on each side of the central position of said finger, in another branch circuit including the armature of said motor, whereby a movement of the contact-finger in either direction from its inactive position throws a full current through the field and a gradually-increasing one through the armature in the same direction.

2. The combination, substantially as hereinbefore set forth, of a main electric circuit, a double-acting contact-finger therein, duplex contact-plates in a branch circuit including the field-coils of an electric motor, a duplex rheostat in another branch circuit including the armature of said motor, a device for actuating the contact-finger in both directions, and a double-acting retarding device which compels the switch slowly to close the circuit and yet allows it quickly to open.

3. The combination, substantially as hereinbefore set forth, of a main electric circuit, a double-acting contact-finger therein, duplex contact-plates in a branch circuit including the field-coils of an electric motor, a duplex rheostat in another branch circuit including the armature of said motor, a cylinder or air-chamber, its central air-passages and air-valves at each end, a piston therein, and double-acting connections between the piston and contact-finger, whereby its circuit-closing movements are retarded, while its opening movements are unobstructed.

4. The combination, substantially as hereinbefore set forth, of the switch-lever of an electric motor, a double-acting controlling pneumatic cylinder having an air-inlet valve in each end and air-passages at the middle, a piston therein, and a connection between the switch-lever and piston.

5. The combination, substantially as hereinbefore set forth, of an electric motor, its switch-lever, duplex contact-plates and rheostats on each side of the neutral position of the lever, circuit connections including the motor, contacts, plates, and rheostats, an actuating-rope, stops carried thereby for moving the switch-lever in either direction, a pneumatic cylinder, and its piston, with which the rope is connected, said cylinder having inlet-valves at its end and open air passages at the middle, for the purpose described.

6. The combination, substantially as hereinbefore set forth, of an electric motor, its circuit connections, a circuit-controlling switch

therein, a device E, acting to determine the direction of motion of the driven apparatus, a double-acting device connecting the switch-lever and device E, and a retarding device acting upon the switch to slow its motion in one direction, whereby the motor is compelled to start gradually, but may be stopped quickly.

7. The combination, substantially as hereinbefore set forth, of a main electric circuit, a double-acting contact-finger therein, duplex contact-plates in a branch circuit including the field-coils of an electric motor, a duplex rheostat in another branch circuit including the armature of said motor, an air-chamber, its central air-passages and end valves, a piston therein, a shifting device E to determine the direction of the motion of the driven apparatus, and a double-acting flexible connection—such as a chain or rope—connecting the piston, the device E, and the contact-finger, so as to gradually close the circuit through the motor and yet allow it to be quickly opened.

In testimony whereof I have hereunto subscribed my name.

ALBERT L. PARCELLE.

Witnesses:
WM. A. MACLEOD,
ROBT. WALLACE.