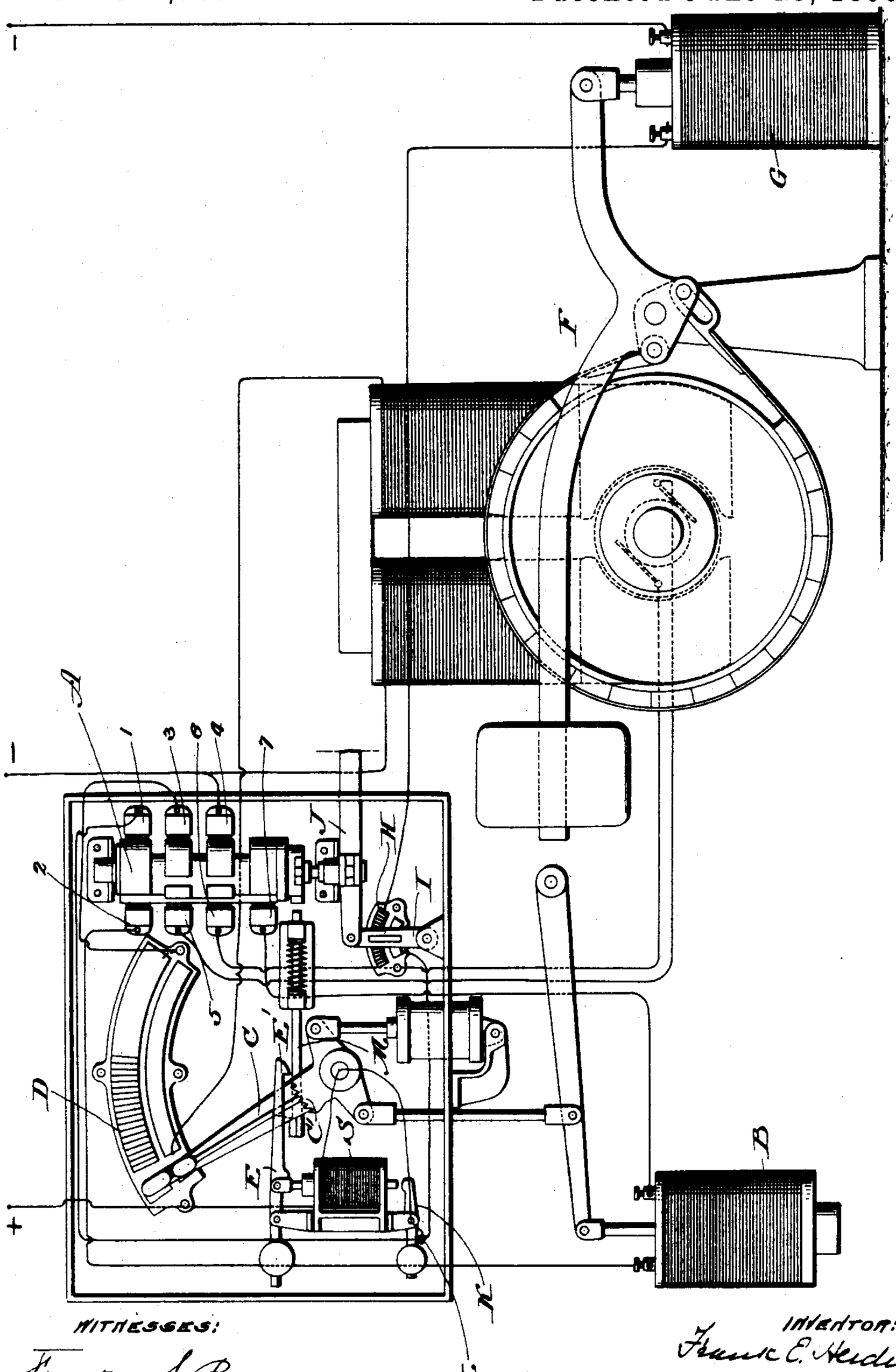
(No Model.)

F. E. HERDMAN.

ELECTRIC BRAKE CONTROLLER.

No. 541,545. Patented June 25, 1895.



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FRANK E. HERDMAN, OF WINNETKA, ILLINOIS.

ELECTRIC BRAKE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 541,545, dated June 25, 1895.

Application filed December 18, 1894. Serial No. 532,174. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. HERDMAN, a citizen of the United States, residing at Winnetka, county of Cook, and State of Illinois, have invented a new and useful Improvement in Electric Brake-Controllers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms a part of this specification.

My invention relates to elevators, electrically operated, its object being to provide means whereby when the load on the car is above the limit of safety or the car becomes jammed in the shaft, thereby putting extra work upon the motor, or when the current passing through the armature of the motor for any other reason becomes excessive, the electric circuit to the armature will be automatically opened and the brake automatically applied.

The figure is a view in side elevation of the motor, motor-controlling switches, brake, brake-controlling solenoid, and of the mechanism that I prefer to use to carry out my invention, which figure illustrates, also, the various circuits from the source of supply through the operating mechanism to the armature of the motor and to the brake-controlling solenoid.

A is the reversing switch of the general type shown in Letters Patent No. 519,120, issued to me on the 1st day of May, 1894.

1, 2, 3, 4, 5, 6 and 7, are the several brushes for the switch, the latter being electrically connected with one pole of the source of supply.

B is the secondary switch-controlling solenoid, in electrical connection with brushes 2 and 7.

C is the secondary switch in the armature circuit adapted, when solenoid B is energized, to travel over resistances D (also in the armature circuit), and thereby close the circuit to the armature. The switch when it occupies the position illustrated in the drawing (at which time solenoid B is not energized) is insulated from the resistances. Consequently, the circuit to the armature is open. As the solenoid is energized, the arm will move onto the resistances, closing the circuit, and over the resistances, gradually cutting them out of circuit and increasing the strength of the current to the armature.

S is a safety solenoid, in circuit with the armature, being electrically connected with one pole of the source of current supply, and with the switch C. Its core is secured to a weighted lever E. When this solenoid is energized sufficiently to draw down its core and overcome the weight on lever E (as it will be when a somewhat excessive current is passing to the armature) the pawl E′ will engage one of the teeth, C′, on the switch arm C, prevent the latter moving any farther over the resistances, and prevent any increase of current to the armature.

F is a brake consisting of an intermediately pivoted weighted lever to which the ends of a brake band are secured. The brake band surrounds a wheel keyed to the motor shaft.

G is the brake controlling solenoid, the core of which is connected to the brake lever, so that the solenoid will act when energized to lift the weight and release the brake band. This brake controlling solenoid G is in electrical connection with one pole of the current supply and with the switch C through lever K and pin L, the character of which connections will be hereinafter more fully described.

Resistances H are interposed in the circuit and a switch lever I, adapted to pass over said resistances and directly connected with the operating bar J, controls the admission of current to the solenoid G. The operating bar J is connected with controlling mechanism in the traveling car. By the same movement of the operating bar which operates the main drum switch to close the circuit to the armature and start the machine, the switch lever I is caused to move over resistances H cutting them out of circuit and energizing solenoid G to release the brake.

On the bracket supporting the solenoid S and the weighted lever E, and beneath the solenoid, is pivoted intermediately the weighted lever K in electrical connection with the switch C. Directly beneath the weighted end of the lever is a contact pin L upon which the lever rests so as to be electrically connected therewith, the pin L being in electrical connection, as before described, with solenoid G. The free end of lever K is directly be-

neath the solenoid S, and is adapted to be engaged thereby, if an abnormal current passes through the solenoid.

The resistances D are in electrical connection with brush 3 of the reversing switch and the two poles of the armature with brushes 5 and 6, respectively. Contact pin L, besides its connection with lever K and solenoid G, is also electrically connected with brush 1. By turning the reversing switch either to the right or left, the following connections through the medium of a plate on the switch, are made: Brush 1 is electrically connected with brush 2, brush 3 with either of brushes 5 or 6 (depending upon the direction in which the switch is turned) and brush 4 with the other of said two brushes, and brush 7 with brush 4.

When the reversing switch is thrown to the right or left and the brushes connected in the manner just described, the circuit to solenoid B is closed, as it is now connected with one pole of the supply through solenoid S, switch arm C, lever K, contact point L and brushes 1 and 2, and with the other pole through brushes 7 and 4. The energizing of solenoid B immediately moves the switch arm C in contact with the resistances, which closes the circuit to the armature, the latter being connected with one pole of the supply through solenoid S, switch arm C, resistances and brushes 3 and 5 (or 6), and with the other pole through brushes 6 (or 5) and 4.

I have already described the action of solenoid S in stopping further movement of switch arm C, in case the strength of the current is above the normal. If the excess of current is very great, the core of solenoid S will be drawn down still farther and will strike the free end of lever K, push it down, overcoming the weight, and break the contact between lever K and pin L. This pin, as already described, normally receives current from the lever and forms the junction of the currents to solenoids B and G. The breaking of this contact will therefore demagnetize both solenoids and cause the switch arm C on the one hand, to move back over the resistances (under the action of the weight of the core to solenoid B) and open the circuit to the armature, and, on the other hand, free the brake-weight from the restraining action of solenoid G and cause the brake to be applied instantly.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. The combination with an electric motor, of a brake for said motor, a solenoid to control said brake, a switch in the circuit to said solenoid and a solenoid in the armature circuit the core of which is adapted when energized to move said switch and break the circuit to the brake solenoid.

2. The combination with an electric motor, of resistances in the armature circuit, an arm for controlling said resistances, a solenoid the core of which is connected to said arm, a switch in the circuit to said solenoid and a solenoid in the armature circuit the core of which is adapted when energized to move said switch, and break the circuit to the resistance arm solenoid.

3. The combination with an electric motor, of a brake for said motor, a solenoid to control said brake, in electrical connection with one pole of the source of supply, a contact pin in electrical connection with the solenoid, an intermediately pivoted weighted lever in contact with the other pole of the source of supply, the weighted end of said lever being in contact with said pin, and a solenoid in the armature circuit, the core of which is adapted when energized to move the free end of said lever and lift its weighted end out of contact with said pin.

4. The combination with an electric motor, of resistances in the armature circuit, an arm for controlling said resistances, a solenoid the core of which is connected to said arm, a contact and an intermediately pivoted lever in the circuit to the solenoid, said arm being normally in contact with the weighted end of said lever, and a solenoid in the armature circuit the core of which is adapted when energized to move the free end of said lever and lift its weighted end out of contact with said pin.

5. The combination with an electric motor, of resistances in the armature circuit, an arm for controlling said resistances, a solenoid the core of which is connected with said arm, a brake for the motor, a solenoid to control said brake, a switch common to the circuits to both solenoids, and a solenoid in the armature circuit the core of which is adapted when energized to move said switch and break the circuits to the brake solenoid and resistance arm solenoid.

6. The combination with an electric motor, of resistances in the armature circuit, an arm for controlling said resistances, a solenoid the core of which is connected with said arm a brake for the motor, a solenoid to control the brake, a contact pin and an intermediately pivoted lever in a circuit common to the circuits to the resistances arm solenoid and brake solenoid, said pin being normally in contact with the weighted end of said lever, and a solenoid in the armature circuit the core of which is adapted when energized to move the free end of said lever and lift its weighted end out of contact with said pin and break the circuit to both of the first named solenoids.

In testimony of which invention I have hereunto set my hand.

FRANK E. HERDMAN.

Witnesses:
C. D. HOYT,
J. J. O'MEARA.