

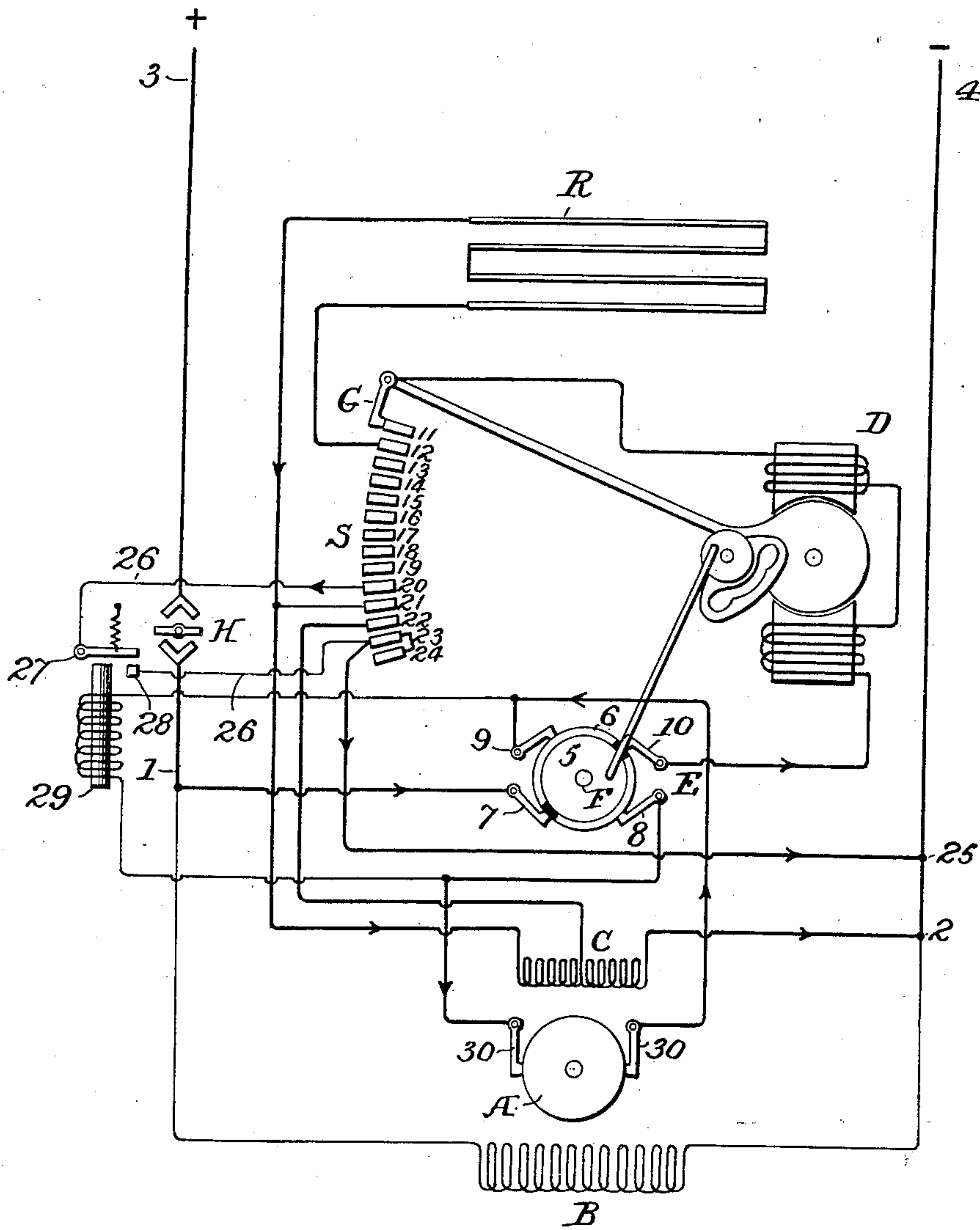
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PATENTED JULY 21, 1903.

J. D. IHLDER.
MOTOR CONTROL.

APPLICATION FILED SEPT. 9, 1902.

NO MODEL.



Inventor

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UNITED STATES PATENT OFFICE.

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MOTOR CONTROL.

SPECIFICATION forming part of Letters Patent No. 734,178, dated July 21, 1903.

Application filed September 9, 1902. Serial No. 122,730. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. IHLDER, a citizen of the United States, residing at Yonkers, in the county of Westchester, in the State of New York, have invented certain new and useful Improvements in Motor Control, of which the following is a specification, accompanied by drawings.

My invention relates to the control of electric motors, being adapted more particularly for use with electric motors for running elevators, although it may be applied to electric motors in any connection where it is applicable.

The objects of my invention are to increase the effectiveness of the control of the motor and prevent accidents in case the manual controlling means should fail to operate, and a further object of my invention is to automatically control the motor independently of the manual controlling means therefor.

Further objects of my invention will hereinafter appear; and to these ends my invention consists in motor-controlling apparatus for carrying out the above objects, arranged and constructed and having a general mode of operation substantially as hereinafter fully described and shown in this specification and the accompanying drawing, which represents diagrammatically apparatus embodying my invention.

Referring to the drawing, A represents a suitable electric motor which may be operatively connected to drive an elevator, the connections not being shown in this instance, although the motor may of course be connected to operate any desired mechanism or machine. The motor may be suitably wound, as shown it being compound wound, the shunt field-winding B being connected at the points 1 and 2 to the positive and negative mains 3 4, while the series field C is connected in series with the armature, starting resistance R, and an electromagnetic dash-pot D. A suitable reversing-switch E, comprising a disk 5, having insulated conducting portions 6, with brushes 7, 8, 9, and 10 bearing thereon, is connected in circuit to control the direction of rotation of the motor A, the shaft F of the reversing-switch being assumed in this in-

stance to be manually controlled, as by means of a hand-rope extending to the elevator-car in the case of elevator apparatus.

The armature resistance R is controlled by means of suitable contacts S, a portion of which are also connected to control the field magnetism, as by means of the series field C, a brush G being adapted to be swept over the contacts S by a suitable means manually controlled. In this instance I have illustrated substantially the same operative connections for the brush G as shown in my United States Patent No. 657,416, dated September 4, 1900, as a convenient mechanism. As in the aforesaid patent the brush G is carried on a suitable lever-arm controlled in the usual way by mechanism connected with the shaft F and also controlled by the electromagnetic dash-pot D, as more fully set forth in my United States Patent No. 560,216, granted May 19, 1896. The brush G normally rests on the insulated contact 11, while a pair of the brushes of the reversing-switch E rests on the insulated portions of the disk.

In order to start the motor, the switch H must be closed and the reversing-switch E operated to close the circuit in one direction or the other to the armature of the motor, the movement of the reversing-switch serving to operate the brush G by means of the mechanism described and move it over the contacts S, gradually cutting out the starting resistance R and finally deenergizing the series field C, which is included in circuit at first in order to produce starting torque for the motor. The contacts 13 to 18, inclusive, of the series S are not shown as connected to the resistance R, it being understood that they may be so connected at suitable points in order to cut out the resistance step by step; but, as stated, the connections have been omitted for the sake of simplicity.

Assuming that the brush G has been moved upon contact 12 and that brushes 7 and 8 are in contact with segment or conducting portion 6, current will then pass from the positive main 3, through switch H to brush 7, and from brush 8 through the motor-armature to brush 9, and from brush 10 through the windings of the electromagnetic dash-pot

D, and thence through brush G and contact 12 to and through the whole of resistance R, and thence through the series winding of the motor C to the negative main 4 and out.

5 As the brush G is moved over the contacts S more and more of the resistance R is cut out, until the brush having reached contact 21 all of the resistance will have been cut out and the current will pass directly from said
10 brush through the series field C to the negative main. The continued movement of the brush G to and upon contact 22 will cause one portion of the series field C to be deenergized or cut out of circuit, and upon the
15 movement of the brush G to contact 23 the current will pass directly to the negative main 4, as at the point 25, thereby deenergizing the whole of the series field C.

When the motor is to be stopped, the operator moves the brush G back over the series
20 of contacts S, thereby first cutting in the series field C again and then including the resistance R in circuit before the motor is stopped.

25 In the operation of starting it often happens that the operator fails to move his lever far enough to cause the cutting out or deenergizing of the series field C, and according to my invention means are provided for automatically deenergizing the series field irrespective of the movements of the brush G.
30 The means provided will also cut out the series field automatically when the operator moves the brush back again over the contacts S to stop the machine, thereby preventing an increase of speed if the motor is acting as a generator, which increase of speed it is very desirable and sometimes necessary to obviate in order to prevent accidents.

40 While any suitable auxiliary means or safety device may be provided operating independently of the manual controlling means for accomplishing the ends in view, I have shown a short circuit 26, including armature
45 27 and contact 28, the armature 27 being controlled by an electromagnet 29, included in circuit in this instance directly across the brushes 30 of the motor A, and thereby operating on the armature potential and controlled in its operation by the armature speed.
50 The magnet 29 is in this instance so adjusted that it will not operate to close circuit at the armature 27 and contact 28 until the motor has reached substantially full speed. When
55 this happens, the potential will be sufficient to cause the attraction of the armature 27 and the closure of the short circuit 26 around the series field C irrespective of the position of the brush G. In a like manner when the
60 brush G is moved back again over the contacts S if the machine should be operating as a generator the magnet 29 will again come into operation upon an increase of speed of

the machine and short-circuit the series field, thereby reducing the speed.

Obviously some features of my invention may be used without others, and my invention may be embodied in widely-varying forms.

Therefore, without enumerating equivalents nor limiting myself to the construction shown and described, I claim, and desire to obtain by Letters Patent, the following:

1. The combination with a motor, of controlling means connected to operate under
75 control of the armature potential for deenergizing the series field when the motor reaches substantially full speed, substantially as described.

2. The combination with a motor, of hand-
80 operated means for controlling the series field, and independent means for automatically deenergizing said field when the motor has reached substantially full speed, substantially as described.

3. The combination with a motor, of means for controlling the armature resistance on starting and stopping, and auxiliary means for automatically controlling the series field,
85 substantially as described.

4. In motor-controlling apparatus, the combination of hand-operated means for cutting in and out the starting resistance and series field on starting and stopping, and independent automatic means for controlling the series field, substantially as described.

5. The combination with a motor, of manual means for controlling the starting resistance and field magnetization, and an automatic safety device for providing additional control of the field magnetization, substantially as described.

6. The combination with a motor, of manual means for controlling the starting resistance and field magnetization, and an automatic safety device operative independently of said manual controlling means for controlling the field magnetization, substantially as described.

7. The combination with the reversing-
110 switch, starting resistance and series field of a motor, of manual means for controlling said resistance and field on starting and stopping, and an electromagnet operative on armature potentials for controlling a short circuit
115 around said series field, and adjusted to close said short circuit when the armature reaches substantially full speed, substantially as described.

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

JOHN D. IHLDER.

Witnesses:

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