

(No Model.)

2 Sheets—Sheet 1.

F. E. HERDMAN.
CONTROLLING DEVICE FOR ELECTRIC MOTORS.

No. 519,123.

Patented May 1, 1894.

Fig. 1.

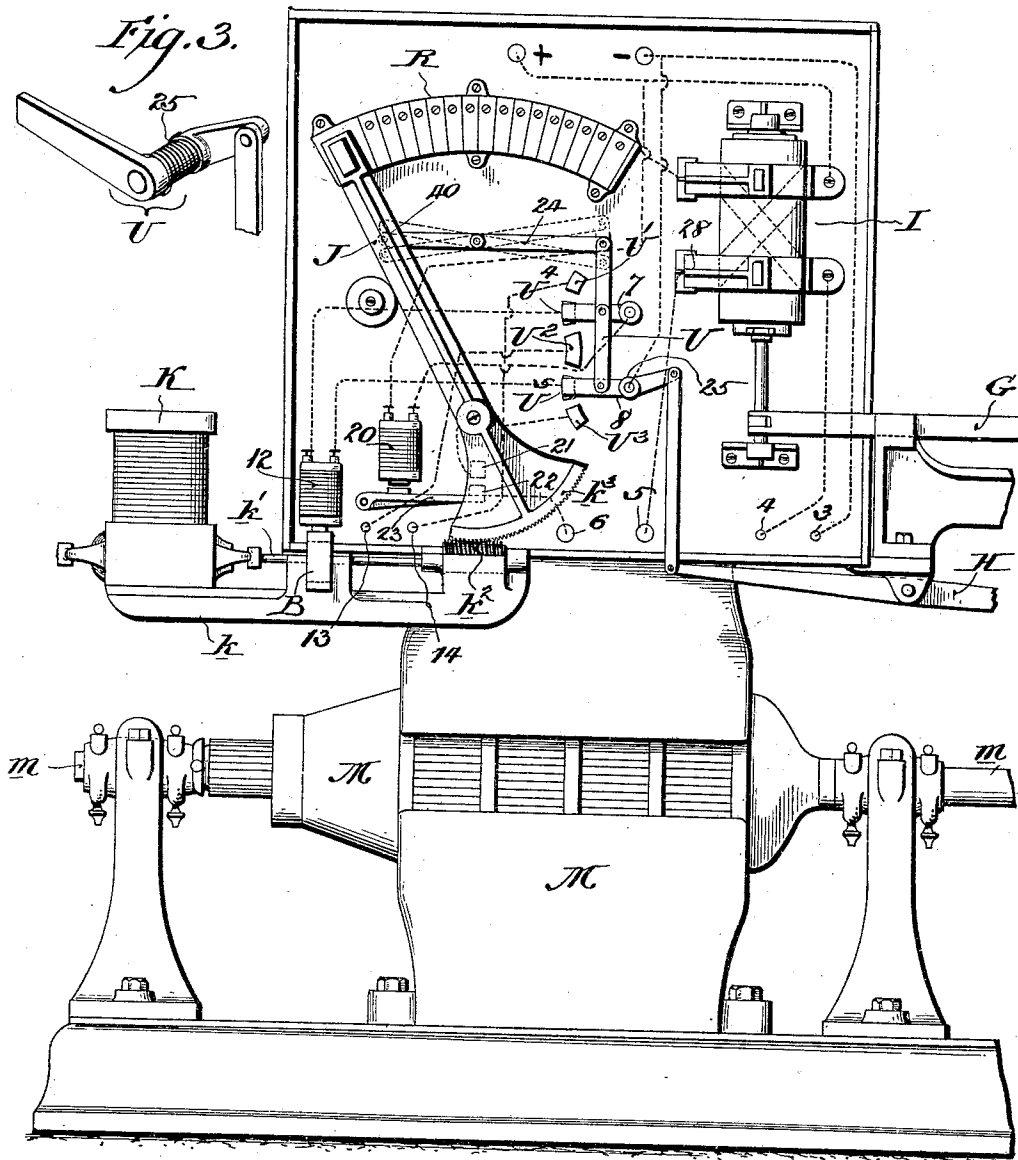


Fig. 3.

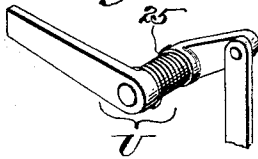
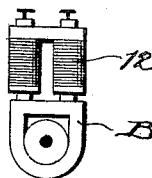


Fig. 2.



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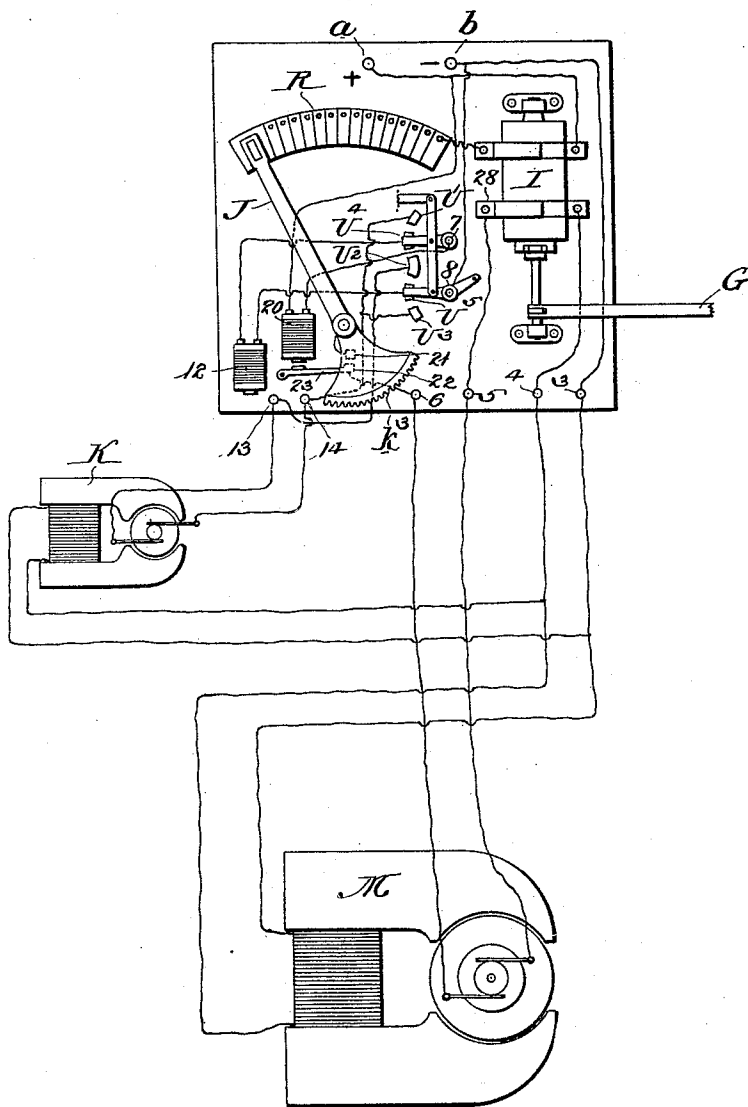
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Fig. 4.



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UNITED STATES PATENT OFFICE

FRANK E. HERDMAN, OF INDIANAPOLIS, INDIANA.

CONTROLLING DEVICE FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 519,123, dated May 1, 1894.

Application filed October 20, 1892. Renewed January 11, 1894. Serial No. 496,549. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. HERDMAN, a citizen of the United States, residing at Indianapolis, county of Marion, and State of Indiana, have invented a new and useful Improvement in Electric-Motor-Controlling Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention specifically relates to the combination and arrangement of devices whereby the admission of the current to the motor is controlled.

In the drawings—Figure 1 is a front elevation of a sufficient portion of my device to illustrate my invention. Fig. 2 is a detached side elevation of the brake B and magnet 12. Fig. 3 is a detached perspective view of a portion of switch V showing the spring 25. Fig. 4 is a diagrammatic view showing the direction of the circuits and their connections with the different parts of the machine.

M is the motor, *m* the motor shaft by which the power of the motor is transmitted to the machine or apparatus to be driven by said motor.

I is the armature controlling switch. The field magnets of the motor M are in electrical connection with binding posts (*a*, *b*) each of which is in electrical connection with one pole of current supply, said switch being adapted to admit the current in either direction desired to the armature of the motor M, through the resistances R, and binding post 6, said current returning from the armature of the motor M to binding post 5 which is in electrical connection with brush 28.

K is a small motor secured in a fixed position to stand *k*. *k'* is the shaft of this motor, having the worm *k*² which meshes with the segmental gear *k*³, on the end of resistance arm J.

U is the controlling switch for motor K. The switch U has two brushes 7 and 8, one connected with each pole of the main current supply. The brush 8 is electrically connected with one pole of current supply and the brush 7 is electrically connected to the magnet 20; the magnet 20 being also in direct electrical connection with the pole of the main current supply opposite to that with

which brush 8 is connected. The contacts U' and U³ are connected with binding post 14 which is connected to the armature of the motor K. The return wire from the armature of the motor is connected with binding post 13 which in turn is connected with contact U². Between the contacts U' and U² is contact U⁴ which is connected with magnet 12, the other pole of this magnet is connected with contact U⁵, between contact U² and U³.

H is the operating arm for switch U, and G is the operating bar for switch I. The switch U has a spring 25 connected between its brush 8 and the arm connecting it with operating bar H, so that with the compression of this spring, the brush 8 can be moved independent of the arm H (see Fig. 3). The magnet 12 operates a brake B on the shaft *k'*, and is operated when the current is admitted to magnet 12 to clamp the brake. By the movement of the switch U up or down the direction of the current through the motor K is controlled, this current as described passing through magnet 20 but no current passing through magnet 12 when brushes are in their extreme position. When the brushes of switch U are brought to their central position they are in contact with contacts U⁴ and U⁵ which are in circuit with magnet 12. When in this position the current is cut out of the motor K and the brake is applied by the magnet 12, the magnet 20 still being maintained in electrical circuit.

The object of magnet 20 is as follows: J is the resistance arm having a brush adapted to travel over the resistances R. This arm J is in electrical connection with armature of the motor M, as follows:—6 is a binding post with which the armature of the motor is in electrical connection. 21 and 22 are contacts—21 being permanent and in electrical connection with arm J and 22 being in electrical connection with post 6, the contact 22 is attached to lever 23, to which lever is connected the armature of the magnet 20. When current is passing through magnet 20 the armature is held up and contacts 21 and 22 are touching each other, but if for any cause the current fails to pass through magnet 20 then the armature drops removing contact 21 from contact 22 and current is no longer conveyed to the motor M.

The operation is as follows:—The main switch I being operated the current is admitted to the resistances R. And upon the switch U being operated the current is admitted to motor K which through the medium of worm and segmental gear, causes resistance arm J to travel over the resistances; thus through arm J contacts 21 and 22 and binding post 6 admitting current to the armature of motor M. At the same time that the current is admitted to the armature of motor K the current is broken through the magnet 12 thereby relieving the brake B. As will be seen the current is constantly maintained through the magnet 20, for when the motor K is not in circuit the magnet 12 is in circuit and vice versa. In consequence as long as the current passes in this circuit the circuit through contacts 21 and 22 is closed. If from any cause, when the motor K is in circuit consequently operating the arm J it should become inoperative, it would leave the motor M running and no means to stop it. The magnet 20 supplies the means for breaking the circuit through the motor K when thrown into circuit by switch U would also break the circuit through magnet 20 and this would break the circuit through motor M, stopping it.

24 is a lever in connection with switch U. 40 is a pin, on arm J, which in the movement of arm J to the right or left strikes the end of this lever 24, bringing the switch U to the central position by compressing the spring connecting brush 8 and operating the arm H, thus breaking the circuit through the motor K and closing the circuit through the magnet 12.

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

1. The combination with an electric driving motor, an armature controlling switch, resistances interposed between the source of current supply and armature of motor, an arm, in electrical connection with and adapted to travel over said resistances, a gear on the end of said arm, a worm meshing with said gear, a motor as K to operate said worm, an armature controlling switch for said motor K, electric connection between the contacts of said switch and armature of motor K, devices for operating said motor switches, a contact as 21 connected to resistance arm, a contact as 22, said last contact being in electrical con-

nection with the armature of driving motor, a pivoted lever to which said contact 22 is connected, said contacts 21 and 22 being in line with each other, an electro-magnet, the armature of which is in line with the lever carrying contact 22, and electrical connection between the source of current supply and said magnet.

2. The combination with an electric driving motor, an armature controlling switch, resistances interposed between the source of current supply and armature of motor, an arm in electrical connection with and adapted to travel over said resistances, electrical connection between said arm and armature of driving motor, a gear on the end of said arm, a worm meshing with said gear, a motor as K to operate said worm, an armature controlling switch for said motor K, connection between said switch and source of current supply, contacts as U' U², U³, electric connection between one pole of armature of driving motor and contact U' and U³ and between the other pole of armature and contact U². Contacts as U⁴ and U⁵, a brake on the shaft of motor K, a magnet to operate said brake and electrical connection between said magnet and contacts U⁴ and U⁵ and controlling mechanism for each of said armature controlling switches.

3. The combination with an electric driving motor of an armature circuit controlling switch, resistances interposed in said armature circuit, a resistance arm in electric connection with the armature and resistances and adapted to travel over said resistances, a gear on the end of said arm, a motor the shaft of which operates a worm meshing with said gear, electric connection between said motor and the source of current supply, an armature circuit controlling switch for said motor, an operating bar to operate said switch, a spring connection between said bar and the switch, a bar as 24 connected to said switch, said bar being centrally pivoted, a projection on the resistance arm in line with the end of said arm.

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

FRANK E. HERDMAN.

Witnesses:

W. V. MARTIN,
JOSEPH COOK.