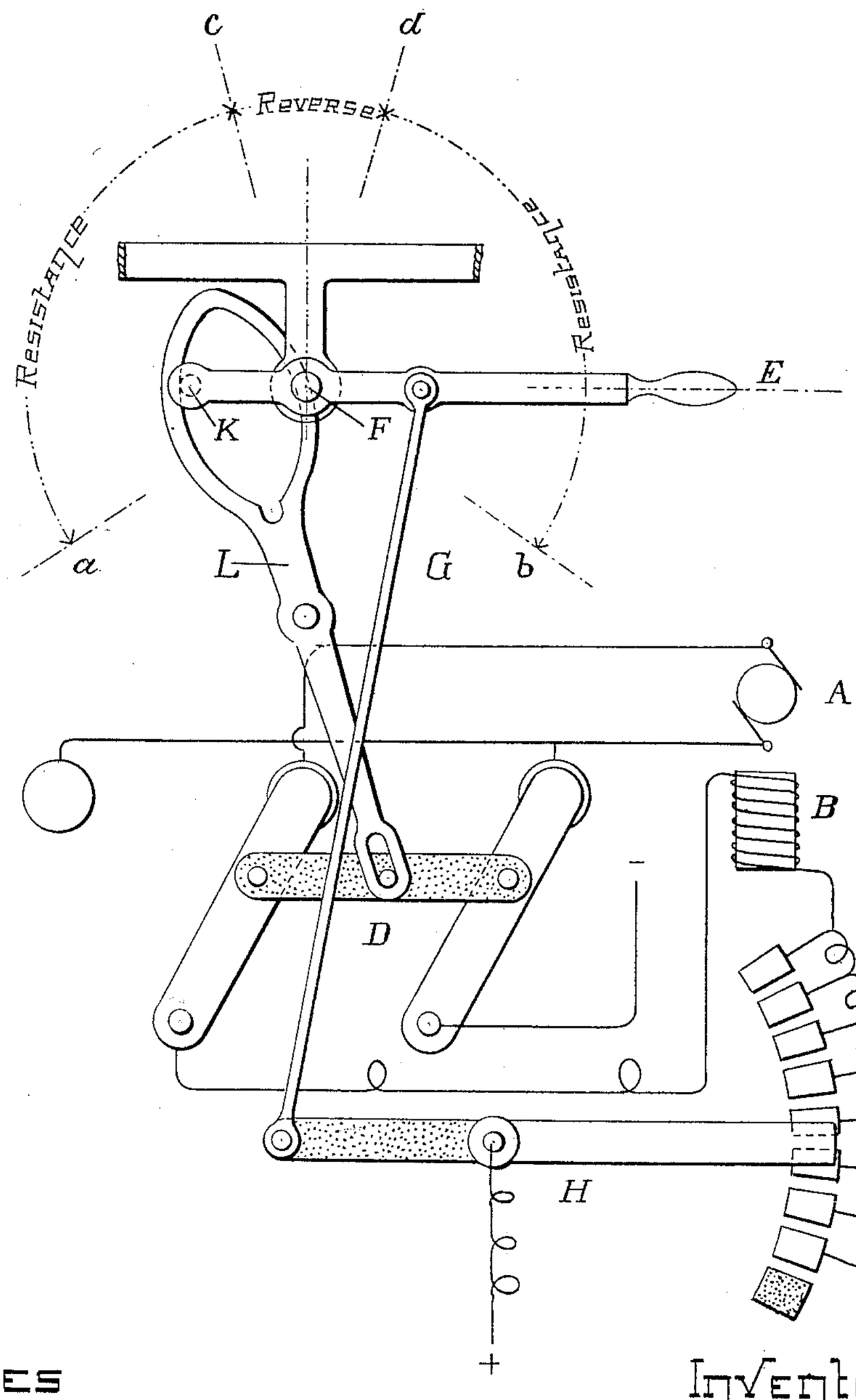
(No Model.)

F. O. BLACKWELL.

CONTROLLING DEVICE FOR ELECTRIC MOTORS.

No. 462,369. Patented Nov. 3, 1891.



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CONTROLLING DEVICE FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 462,369, dated November 3, 1891.

Application filed July 13, 1889. Serial No. 317,374. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS O. BLACKWELL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Controlling Devices for Electric Motors, of which the following is a specification.

My invention relates to a controlling device for electric motors in which a motor is provided with means for controlling its speed, such as a resistance, and also with means for reversing its direction of movement—for example, a switch for reversing the direction of current, either in the armature or field.

My invention consists in providing a single lever or handle for operating both the controller and the reverser, a certain range of movement of the handle acting to work the controller, and a further movement acting, first, to reverse, and, secondly, to operate the controller.

My invention is illustrated in the accompanying drawing.

In the drawing, A represents the armature of the motor; B, the field-magnet; C, a controller—as, for example, a resistance—and D a reversing device—as, for example, a switch changing the direction of current in the armature.

A common handle E for operating both the controller and the reverser is employed. This handle E is pivoted at a center F and has a total range of movement from *a* to *b*. Upon one side of center F a connecting-rod G extends to lever H of resistance C. On the opposite side of center F is a pin K, extending into an elliptical-shaped opening in one end of lever L of the reverser. The elliptical-shaped opening of lever L has such a contour that while the operating-lever passes from *c* to *d* the engagement of pin K with lever L operates the reversing-switch from one side to the other, while a further movement of E in either direction causes no further movement of lever L, but simply actuates the lever H to vary the resistance C. The lever E in the drawing is shown with the resistance partly cut out. As it proceeds in its movement from *b* toward *d* it will actuate lever H to bring in the whole of resistance C. When passing from *d* to *c* it passes over a dead-center with regard to the resistance; but with regard to the reverser the stud K is in a position to throw the lever L from one side to the other, and thereby actuate the reversing-switch. A further movement of handle E from *c* to *a* gives the lever H exactly the same movement that it has when E is passing from *a* to *b*. By this arrangement only a single lever is necessary for the complete control of the motor, and but one resistance and one set of contacts, therefore, are essential.

It will be observed that no matter which way the handle E is thrown from its normal central position between the points *c d* it will move the lever H in the same direction, and thus have a like regulating effect upon the motor-current, while the engagement of the pin K with the sides of the cam-opening in lever L will lock the reversing-switch against movement at all times, except when the actuating-handle passes its central position, thereby throwing the switch, as before described.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with an electric motor, of a current-controller and circuit-reverser therefor, a common actuator positively actuating both, but allowing the controller a predetermined amount of lost movement relative to the reverser, for the purpose set forth.

2. The combination, with an electric motor, of a current controlling-switch, a circuit-reversing switch, a common pivoted actuator actuating both switches positively, a connection between the actuator and the controlling-switch, such that the latter regulates the motor-current correspondingly upon movement of the actuator in opposite directions from a central position, and a lost-motion connection between the reversing-switch and actuator, whereby the former is thrown by the actuator only when passing its central position, as set forth.

3. The combination, with an electric motor, of a ciruit-reverser moving in opposite directions, respectively, when and for reversing the motor-circuit, a resistance or current-regulator controlled by a contact moving in a

constant direction when increasing or decreasing the motor-current, and a common actuator with which both reverser and regulator are connected, as described.

4. The combination, with an electric motor, of a current-regulator and circuit-reverser, a common pivoted actuator therefor, and intermediate connections, such that movement of the actuator in opposite directions from a central position imparts movement to the reverser in opposite directions, but to the regulator in the same direction, as described.

5. The combination of an electric motor, a current-regulator and circuit-reversing switch in the motor-circuit, with a common actuator connected positively with both, but allowed a predetermined amount of lost movement relatively to the reverser, and a locking device whereby the reverser is locked against movement except when the actuator is about to throw the same, as set forth.

6. The combination, with an electric motor, of a resistance, an actuating-handle therefor, an intermediate connection whereby the action of the handle upon opposite sides of the central point is duplicated, and a reversing-switch actuated by the handle while passing the central position, the connections between reversing-switch and handle allowing a certain amount of lost movement, for the purpose described.

7. The combination, with an electric motor, of the resistance C in the motor-circuit, an operating-handle E, a reversing-switch D, a power connection G, whereby throwing the handle E upon opposite sides of a central position regulates the motor correspondingly, and a lever L, connected to the reversing-switch D and actuated by the handle E when passing over its central position, as set forth.

8. The combination, with an electric motor, of a resistance and reversing-switch therefor, a pivoted arm E, the lever L, provided with double cam-surfaces, the arm and lever being connected, respectively, with the resistance and circuit-reverser and operating them successively, as described.

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Witnesses:
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