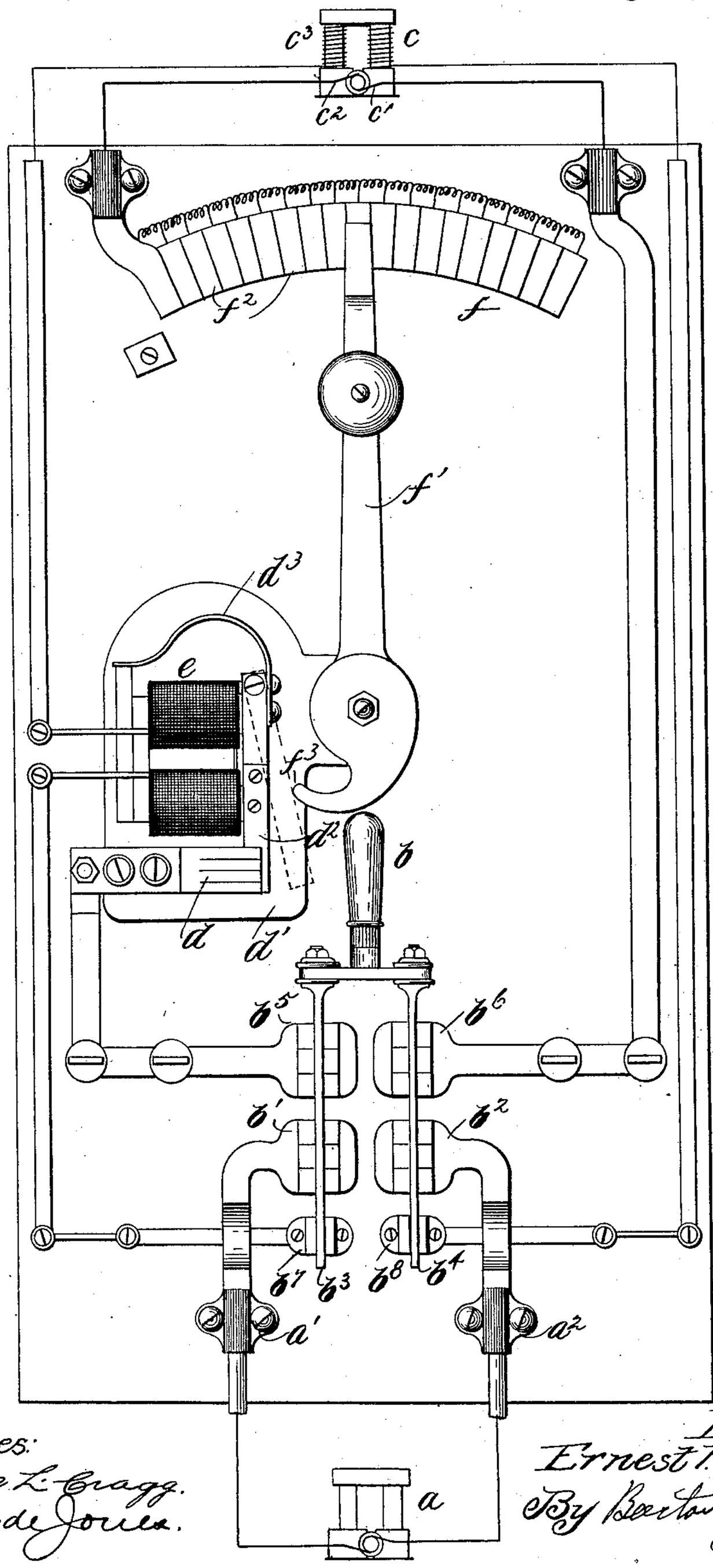
(No Model.)

E. P. WARNER.

CUT-OUT FOR ELECTRIC MOTORS.

No. 565,867. Patented Aug. 11, 1896.



Witnesses:
George L. Cragg.
W. Clyde Jones.

Inventor:
Ernest P. Warner.
By Baxter & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

ERNEST P. WARNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

CUT-OUT FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 565,867, dated August 11, 1896.

Application filed March 5, 1895. Renewed July 18, 1896. Serial No. 599,745. (No model.)

To all whom it may concern:

Be it known that I, ERNEST P. WARNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Cut-Outs for Electric Motors, (Case No. 59,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to a motor cut-out, my object being to provide means for preventing the starting of a motor without first cutting in the starting resistance of the rheostat. In starting, the counter electromotive force developed by the armature is small, due to the low speed, and in consequence an abnormal current tends to traverse the armature-circuit. To prevent the flow of an abnormal current, it is customary to provide in the armature-circuit a rheostat, the contact-arm thereof being moved by the attendant, as the speed of the motor increases, to gradually cut out resistance until normal speed has been attained, when all of the starting resistance is removed from the armature-circuit. With the contact-arm of the rheostat in position to cut out all of the starting resistance, it will appear that if for any reason the motor is stopped and then started again, the attendant neglecting to move the contact-arm to cut in the starting resistance, the abnormal current will traverse the armature with destructive effects. To prevent the restarting of the motor before the contact-arm of the rheostat has been moved to cut in the starting resistance, I provide a switch in the armature-circuit normally maintained closed by an electromagnet or other responsive device, the electromagnet being adapted upon the cessation of current through the motor to effect the opening of the switch. The switch is inaccessible to the attendant directly and can only be closed by moving the contact-arm of the rheostat to cut in the starting resistance, the switch being closed by that operation.

I will describe my invention more in detail by reference to the accompanying drawing, in which I have illustrated a motor cut-out embodying my invention, the dynamo and generator being indicated diagrammatically.

The dynamo a is connected with binding-posts a' a^2, which are connected, respectively, with the switch-contacts b' b^2 of switch b, said contacts being adapted to be connected through the blades b^3 b^4 of the switch when the switch is closed with contacts b^5 b^6 and with the standards b^7 b^8, upon which said blades are mounted to rotate. The contact b^6 is connected with one brush c' of the motor c, while the contact b^5 is connected with contact-fingers d, mounted upon but insulated from a metallic plate d'. Upon said plate and in electrical contact therewith is pivotally mounted a switch lever or arm d^2, a spring d^3 being adapted to yieldingly maintain said arm out of engagement with said contact-fingers d. Opposite the arm d is situated an electromagnet e, adapted when energized to maintain arm d^2 in engagement with contact-fingers d when arm d^2 is closed. Electromagnet e is included in circuit with the field-coils c^3 of the motor c, being connected between the standard b^7 b^8 of the switch b, the motor-circuit thus being in shunt with the armature. Upon the plate d' is mounted the contact-arm f' of the rheostat f, said arm being in electrical contact with said plate d', and adapted to be moved over the terminals f^2 of the rheostat, the last terminal of the rheostat being connected with the brush c^2 of the motor c. Upon the pivoted end of arm f' is provided a projection f^3, adapted, when the contact-arm is moved to the right, to cut in all of the starting resistance of the rheostat, to engage arm d^2, and move the same into engagement with the contact-fingers d.

The motor being at rest, the arm d^2 will be opened, as shown in dotted lines. The attendant desiring to start the motor, first moves the contact-arm f' of the rheostat to cut in the starting resistance, and in so doing the projection f^3 thereon engages arm d^2 and moves the same into engagement with contact-fingers d. The switch b is then closed, completing circuit through the armature and the field-coils of the motor. The electromagnet e is thus energized and maintains the arm d^2 in engagement with contact-fingers d.

As the speed of the motor increases the attendant moves arm f' to gradually cut out resistance. If for any reason current through the electromagnet e cease, arm d^2 is released and moves under the influence of spring d^3 to open the armature-circuit. The arm d^2 thus remains in its opened position until contact-arm f' is moved to cut in the starting resistance when said arm d^2 is closed into engagement with contact-fingers d. The magnet e, contact-fingers d, and arm d^2 are inclosed in a casing so as to be inaccessible readily to the attendant, so that the only way of closing the switch is by moving the contact-arm to cut in the starting resistance.

I have illustrated my invention as applied to a shunt-wound motor, but it is equally applicable to other types of motors.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a motor cut-out, the combination with a rheostat included in the armature-circuit and provided with a contact-arm adapted to be moved to cut in and out resistance, of a switch in said armature-circuit, independent of said contact-arm, a responsive device included in the motor-circuit and adapted to maintain said switch normally closed and to effect the opening of the same when the current through the motor ceases, said rheostat contact-arm being adapted, when moved, to cut in the starting resistance, to close said switch; whereby the starting of the motor without cutting in the starting resistance is prevented.

2. In a motor cut-out, the combination with a rheostat included in the armature-circuit and provided with a contact-arm adapted to be moved to cut in and out resistance, of a switch in said armature-circuit independent of said contact-arm, an electromagnet included in the motor-circuit and adapted to maintain said switch normally closed and to release the switch to permit the opening of the same when current through the electromagnet ceases, said rheostat contact-arm being adapted when moved to cut in the starting resistance to close said switch, substantially as described.

3. The combination with a shunt-wound motor, of a rheostat included in the armature-circuit and provided with a contact-arm adapted to be moved to cut in and out resistance a switch in said armature-circuit independent of said contact-arm, an electromagnet, included in the field-circuit of the motor and adapted to maintain said switch normally closed and to release the switch when current through the electromagnet ceases, the contact-arm of said rheostat being adapted, when moved to cut in the starting resistance, to close said switch; substantially as described.

4. The combination with the electromagnet e, of the contact-fingers d mounted upon but insulated from the base-plate d', the pivoted arm d^2 and the contact-arm f' mounted upon and in electrical connection with said plate, said arm f' being provided with a projection f^3 adapted to engage and move said arm d^2 into engagement with said contact-fingers d when said contact-arm is moved to cut in the starting resistance, substantially as described.

In witness whereof I hereunto subscribe my name this 16th day of January, A. D. 1895.

ERNEST P. WARNER.

Witnesses:
W. CLYDE JONES,
GEORGE L. CRAGG.