

(No Model.)

H. H. CUTLER.

CIRCUIT CONTROLLER FOR ELECTRIC MOTORS.

No. 585,512.

Patented June 29, 1897.

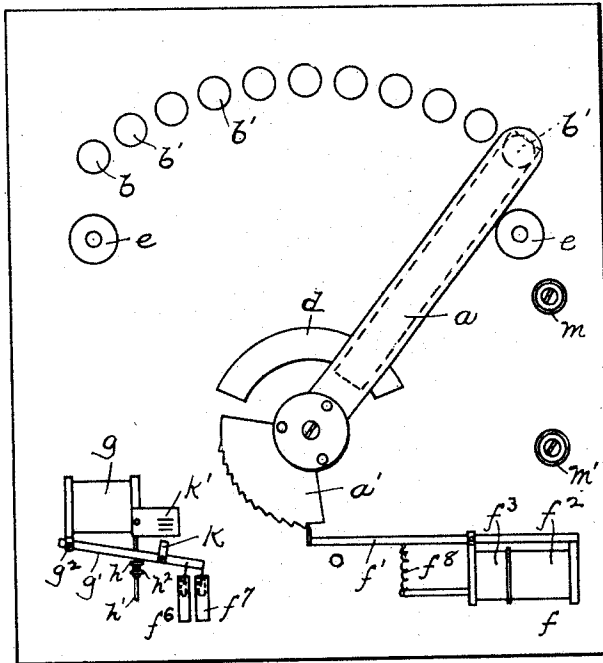


Fig. 1.

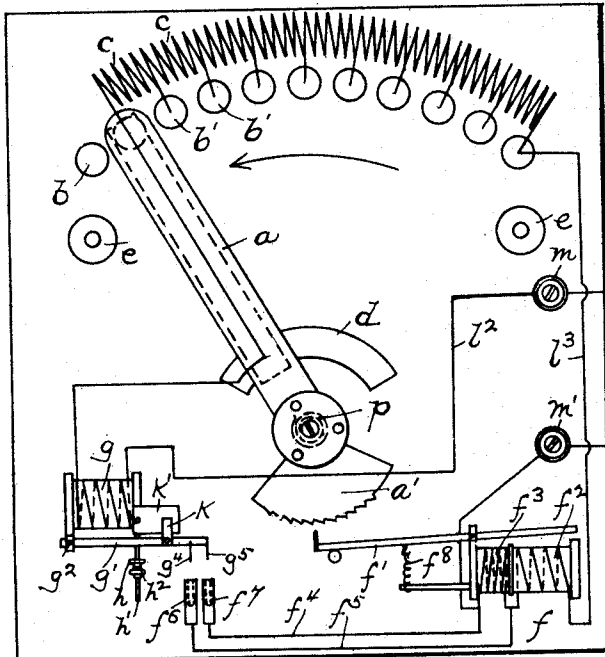
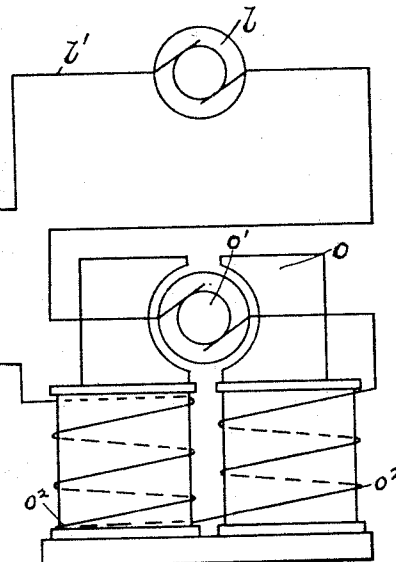


Fig. 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY H. CUTLER, OF CHICAGO, ILLINOIS.

CIRCUIT-CONTROLLER FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 585,512, dated June 23, 1897.

Application filed January 8, 1897. Serial No. 618,457. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. CUTLER, 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 Circuit-Controllers for Electric Motors, (Case No. 2,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a circuit-controller for electric motors, my object being to provide a combined starting resistance and circuit-opener which will act to include the starting resistance in the armature-circuit and then open the circuit upon the flow of an abnormal current.

In accordance with my invention in its preferred form I provide a contact-arm adapted to be moved over a series of contact-terminals to first close the armature-circuit through the starting resistance and then to cut out the starting resistance step by step, the contact-arm being maintained by a retaining-electromagnet during the normal running of the motor in position to exclude the starting resistance from the armature-circuit. The retaining-electromagnet is provided with two coils wound to oppose each other and of equal strength, one of the coils being short-circuited by means of a releasing-electromagnet which, upon the passage of an abnormal current, acts to open the short circuit, thus connecting the oppositely-wound coils of the retaining-electromagnet in circuit, whereby the same is de-energized and acts to release the contact-arm, permitting the same to move through the agency of a spring or otherwise to cut in the starting resistance step by step and finally to open the motor-circuit. The circuit-controller as thus constructed is particularly adapted to series motors, but is also applicable to motors of other types.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a plan view of the circuit-controller of my invention. Fig. 2 is a view thereof, showing the circuit connections in diagram and illustrating the application of the controller to a series motor.

The contact-arm *a* moves over a series of terminals *b' b'*, between which are connected

the coils *cc* of the starting resistance. A dead terminal *b* is provided, and when the contact-arm rests upon the same the motor-circuit is open. Stops *e e* are provided for limiting the movement of the contact-arm. A curved contact-plate *d* is provided with which the under face of the contact-arm or a spring mounted thereon engages to complete circuit between said contact-plate and the terminal upon which the contact-arm may happen to rest.

Upon the contact-arm is provided a sector *a'*, with the teeth of which the end of the armature-lever *f'* of the retaining-electromagnet *f* is adapted to engage to maintain the contact-arm in any position to which the same may be moved. A coiled spring *p* is provided for moving the contact-arm to the left when released. The retaining-magnet *f* is provided with two coils *f² f³*, which are oppositely wound and have equal effect, so that when both are traversed by current they neutralize each other and the retaining-magnet is de-energized. The opposite ends of the coils *f³* are connected by conductors *f⁴ f⁵* with mercury-cups *f⁶ f⁷*, within which rest contacts *g⁴ g⁵*, carried upon the armature-lever *g'* of the releasing-magnet *g*, said lever being pivoted at *g²* and resting upon a nut *h*, screwing upon a rod *h'* and locked in position by a lock-nut *h²*. Upon the armature-lever *g'* is carried an index *k*, resting opposite a graduated scale *k'*, carried upon the magnet, whereby the air-gap between the armature and the pole-piece may be adjusted to cause the releasing-magnet to respond to any predetermined maximum current strength.

The current may be traced from the generator *l*, by conductor *l'*, to binding-post *m*, thence by conductor *l²*, through the releasing-magnet *g*, to contact-plate *d*, thence through contact-arm *a* to one of the terminals *b'*, thence by contact *l³* through coil *f²* of the retaining-electromagnet, thence through the short circuit about the coil *f³*, that is, through conductor *f*, cup *f⁶*, contact *g⁴*, contact *g⁵*, cup *f⁷*, conductor *f⁴*—thence to binding-post *m'*—through the field-coils *o² o²* of the conductor *o*, armature *o'*, back to generator *l*. The retaining-electromagnet is thus energized to maintain the end of the armature-lever in engagement with the sector *a'*. When an abnormal current flows through the motor, the

releasing-magnet g attracts this armature, thus opening the short-circuit about the coil f^s of the retaining-magnet, whereby the retaining-magnet is deenergized, due to the effect of the two coils. The springs f^s draws the armature-lever f' out of contact with the teeth of sector a' , thereby permitting the spring p to move the contact-arm to the left, thereby cutting out the starting resistance and then opening the circuit.

The term "electromagnet," as used in the description and claims, comprehends both electromagnets, in the restricted meaning of that term, and solenoids.

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

1. The combination with a circuit-controlling arm or element, of a retaining-electromagnet for locking the same in position and provided with opposed windings, means for moving said element when released to change the condition of the circuit, and a releasing-electromagnet for normally maintaining one of said windings of said retaining-electromagnet out of operative condition, substantially as described.

2. The combination with a circuit-controlling arm or element, of a retaining-electromagnet for locking the same in position and provided with opposed windings, means for moving the circuit-controlling element when released to change the condition of the circuit, a short circuit about one of the windings of said retaining-electromagnet, and a releasing-electromagnet for normally maintaining said short circuit closed, substantially as described.

3. The combination with a circuit-controlling arm or element, of a retaining-electromagnet for locking the same in position and provided with opposed windings, means for moving the circuit-controlling element when released to change the condition of the circuit, a releasing-electromagnet for normally maintaining one of the windings of said retaining-electromagnet out of operative condition and responding to an abnormal current to place said winding in operative condition, and means for adjusting said releasing-

electromagnet to respond to a predetermined current strength, substantially as described.

4. The combination with an electric motor, of a circuit-controlling arm or element in circuit with the armature thereof, a retaining-electromagnet for locking the same in position, included in the motor-circuit and provided with opposed windings, means for moving the circuit-controlling element when released to open the circuit through the armature, a short circuit about one of the windings of said retaining-electromagnet, and a releasing-electromagnet included in the motor-circuit and normally closing said short circuit and opening the same upon the passage of an abnormal current, substantially as described.

5. The combination with an electric motor, of a starting resistance adapted to be included in the armature-circuit thereof, a contact-arm or other resistance-varying element, means for moving the same when released to cut in the resistance and then open the circuit, a retaining-electromagnet maintaining the contact-arm in position to exclude the starting resistance from the armature-circuit, said electromagnet being provided with opposed windings and included in the motor-circuit, a short circuit adapted to be closed about one of said windings, and a releasing-electromagnet included in the armature-circuit and responding to an abnormal current to open said short circuit and release the contact-arm, substantially as described.

6. The combination with a pivoted circuit-controlling arm, of a segmental ratchet or sector carried thereon, a retaining-electromagnet, and a catch operated by the armature-lever thereof for engaging the teeth of said sector to maintain said contact-arm in any position to which the same may be moved, and means for moving said contact-arm when released by said retaining-electromagnet, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

HENRY H. CUTLER.

Witnesses:

IRVING USNER,
W. CLYDE JONES.