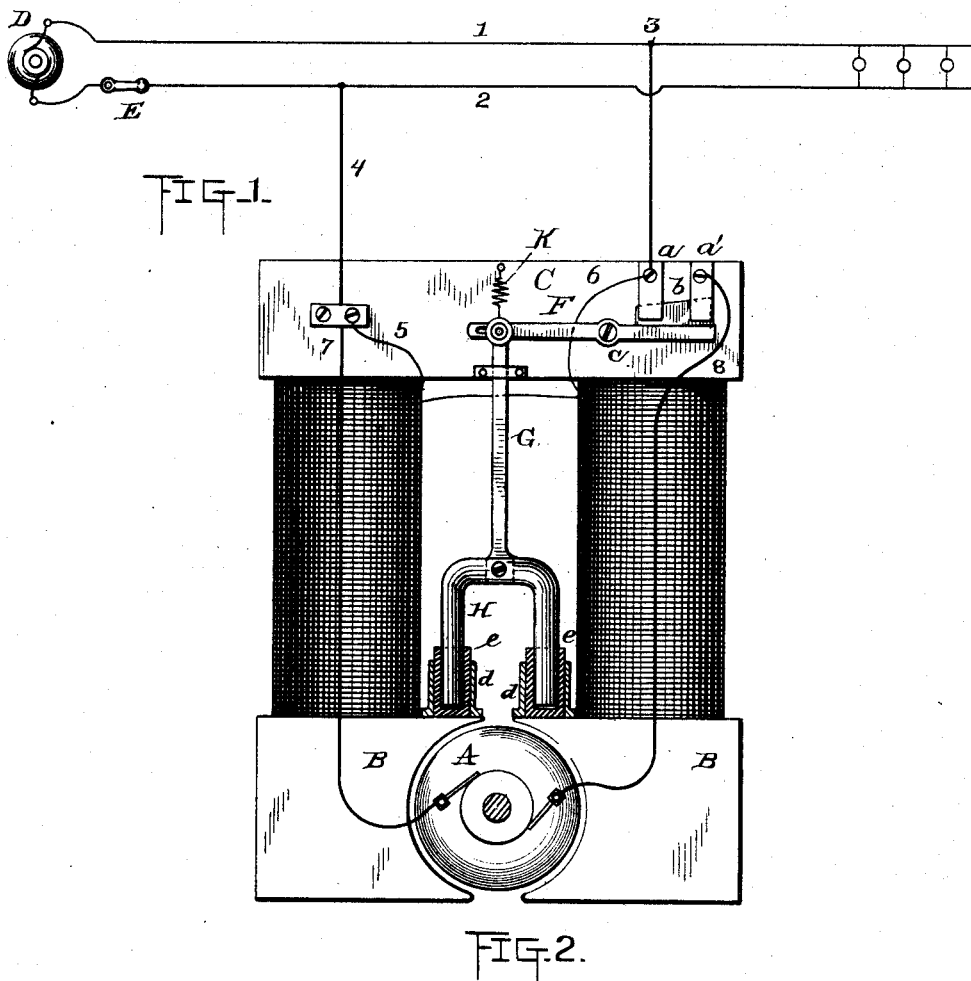


(No Model.)

H. E. WALTER.  
ELECTRIC MOTOR.

No. 422,556.

Patented Mar. 4, 1890.



Witnesses  
*E. Howard*  
*William Ryer*

Inventor  
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*John S. [Signature]*

# UNITED STATES PATENT OFFICE.

HENRY E. WALTER, OF SCHENECTADY, NEW YORK.

## ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 422,556, dated March 4, 1890.

Application filed May 16, 1889. Serial No. 311,045. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY E. WALTER, a subject of the Queen of Great Britain, residing at Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Electric Motors, of which the following is a specification.

This invention relates to electro-dynamic motors which are arranged to be controlled from a distant point, as from a central generating-station, and my object is to provide simple and effective means for starting such motors, so that the current shall not pass through the armature-coils until the field-magnet is charged, whereby injury to the armature or excessive sparking from the passage of current when the field is not energized is avoided. In accomplishing this I make use of a switch for the armature-circuit whose operation is controlled by a magnet energized by the current, such switch being constructed or provided with means for retarding its movement, so that it will not act to close the armature-circuit until the field-magnet is sufficiently charged. I prefer to make use of the attraction of the field-magnet itself for operating the switch.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of an electro-dynamic motor provided with my invention, the circuit-connections being shown in diagram and the magnetic device attached to the field-magnet being in vertical section; and Fig. 2 is a diagram illustrating the use of a magnet other than the field-magnet.

A is the armature of the motor, and B B are the pole-pieces of its field-magnet, of which C is the yoke or keeper. D represents a generator supplying current to this motor, and also to other motors or translating devices. A circuit 1 2 extends from the generator D, and in such circuit is placed a switch E, by closing which the circuit is closed to the motor and the same is started. The motor is in a multiple-arc circuit 3 4, the field and armature being in shunt relation to each other. The circuit 5 6 of the field-magnet coils is constantly closed; but the circuit 7 8 of the armature is broken normally at contact-plates *a a'*, such plates being adapted to be bridged by

the blade *b* of a suitable switch. This switch for closing the armature-circuit consists of a lever F, pivoted at *c*, and connected at its outer end with a vertical arm G, at whose lower end is a U-shaped iron armature or movable core H. Upon each of the pole-pieces of the field-magnet is fixed a sleeve *d*, made of iron and open at both ends, and within each sleeve *d* is placed a brass or other non-magnetic sleeve *e*, which is open at the top and closed at the bottom, where it rests on the pole-pieces. The branches of the U-shaped armature H are arranged to slide in and out of the brass sleeves *e*. In the drawings the parts are shown with the armature H in its lowest position and the switch *b* closed. Before the motor is started, however, the switch *b* is open and the armature H is raised to the top of the sleeve *e*. When current is supplied to the motor by starting the generator D or by closing the switch E, the field-magnet of the motor becomes energized and the attraction of the iron sleeves *d*, which form part of the pole-pieces of the field-magnet, is exerted upon the armature H and draws the same down, raising the switch-plate *b* and closing circuit to the armature between the plates *a a'*. A spring K is provided for retracting the switch and opening the armature-circuit when the supply of current is cut off by stopping the generator or opening the switch E.

The use of the brass sleeves *e*, projecting above the hollow magnets *d*, permits a long movement of the parts, which increases the simplicity in construction of the apparatus, and the tension of the spring K is so adjusted that the switch does not close the armature-circuit until the field is sufficiently charged to prevent the danger or inconvenience which would otherwise arise in starting. This arrangement of a hollow magnet and the internal non-magnetic sleeve may evidently be employed for other purposes where it is desired to obtain a gradual movement over a long distance by magnetic attraction.

Instead of the arrangement just described that shown in Fig. 2 may be employed. The magnet L is energized by a separate multiple-arc circuit 9 10, when the switch E is closed, and such magnet draws down an armature *f*, which carries a switch-lever *g* for closing cir-

cuit at *a a'*, the movement of the switch and armature being retarded by dash-pot *h*, so that the circuit is not closed until the field-magnet is sufficiently energized.

5 While I have described my invention with reference to simple electro-dynamic motors, it is evident that it is also adapted for use with rotating or continuous current-transformers for the purpose of preventing the  
10 passage of current through their armature-coils before the field-magnet is charged, and in referring to motors in the claims I intend to include not only the simple electro-dynamic motor shown, but also continuous current-  
15 transformers or combined generators and motors.

What I claim is—

1. The combination, with an electric motor, of a switch for opening and closing its armature-circuit controlled by the attraction of its  
20 field-magnet, substantially as set forth.

2. The combination, with an electric motor, of a switch for opening and closing its armature-circuit, and a magnet in a constantly-  
25 closed circuit for operating said switch, said switch having a retarded movement, so that the armature-circuit is not closed until after the field-magnet of the motor is energized, substantially as set forth.

30 3. The combination, with an electric motor, of a switch for its armature-circuit and a mag-

netic body attached to said switch and placed in proximity to the poles of the field-magnet of the motor, substantially as set forth.

4. The combination, with an electric motor, 35 of a hollow iron sleeve attached to a pole-piece of said motor, a magnetic core movable in said sleeve, and a switch for the armature-circuit of the motor attached to said core, substantially as set forth. 40

5. The combination, with an electric motor, of a hollow iron sleeve attached to the pole-piece of said motor, a non-magnetic sleeve within the same, a movable magnetic core, and a switch for the armature-circuit attached 45 to said core, substantially as set forth.

6. The combination, with an electric motor, of a switch for opening and closing its armature-circuit, a constantly-closed field-circuit, and a magnet energized by the current in 50 said field-circuit for operating said switch, said switch having a retarded movement, so that the armature-circuit is not closed until after the field-magnet of the motor is energized, substantially as set forth. 55

This specification signed and witnessed this 10th day of May, 1889.

HENRY E. WALTER.

Witnesses:

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