No. 836,978. PATENTED NOV. 27, 1906.

M. C. A. LATOUR.

ALTERNATING CURRENT MOTOR.

APPLICATION FILED MAY 16, 1905.

Fig. 1.

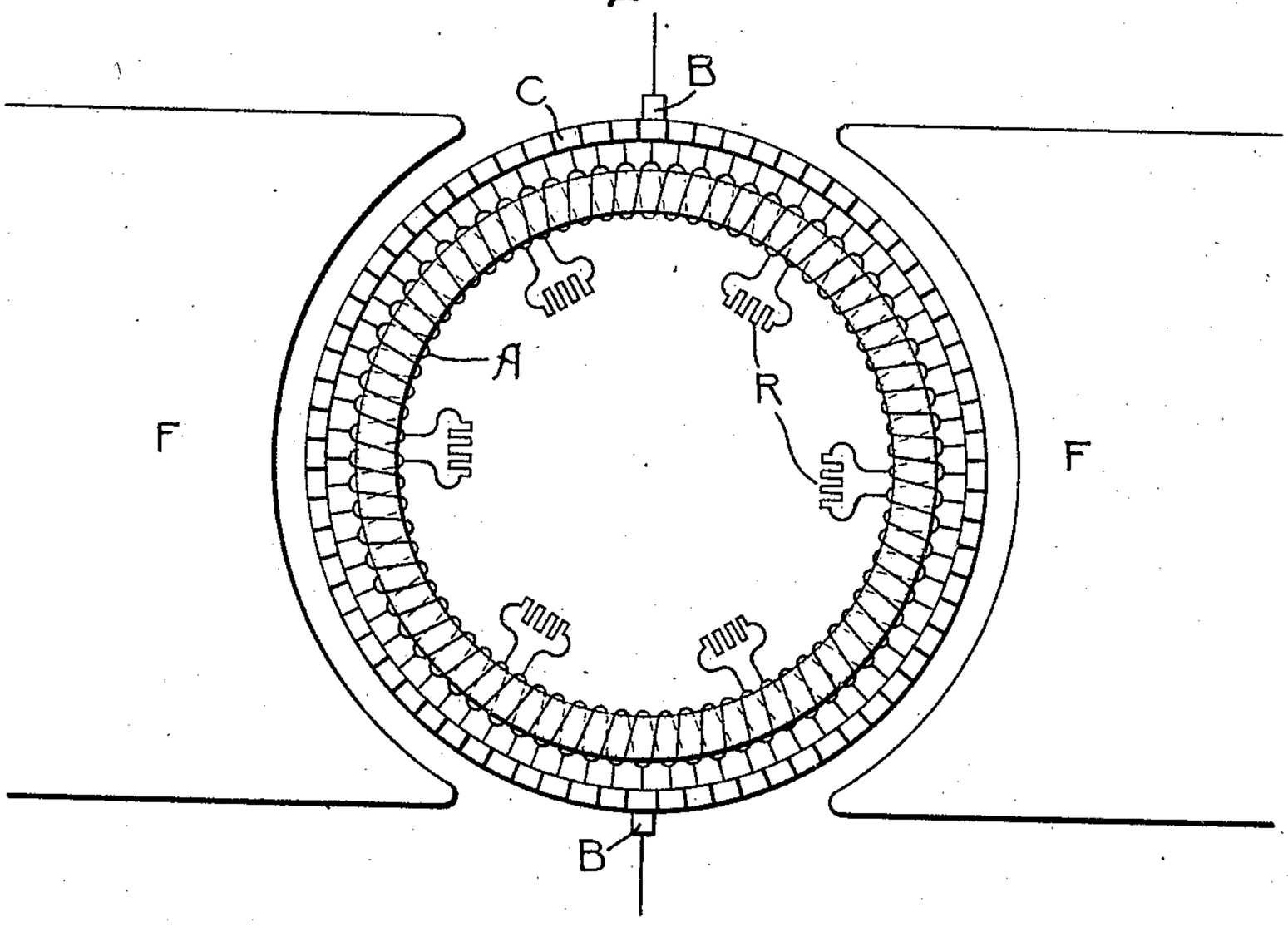
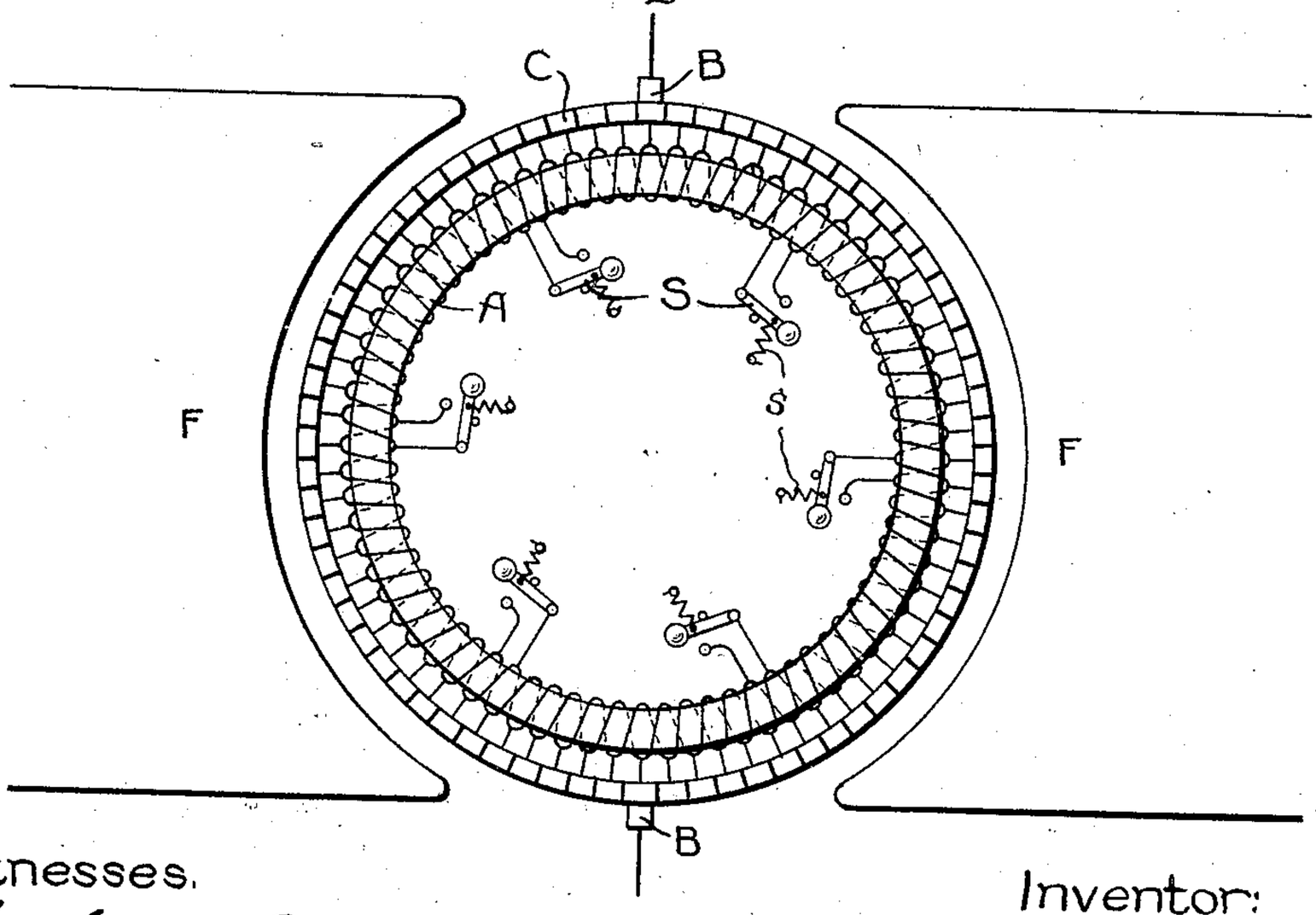


Fig. 2.



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UNITED STATES PATENT OFFICE.

MARIUS C. A. LATOUR, OF PARIS, FRANCE, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ALTERNATING-CURRENT MOTOR.

No. 836,978. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed May 16, 1905. Serial No. 260,628.

To all whom it may concern:

Be it known that I, MARIUS C. A. LATOUR, a citizen of France, residing at Paris, France, have invented certain new and useful Improvements in Alternating-Current Motors, of which the following is a specification.

My invention relates to alternating-current motors of the commutator type, and its object is to provide a novel arrangement of armature-windings whereby commutation is improved and the efficiency increased.

In an alternating-current motor having single armature-winding connected in the usual manner to commutator-segments the armature-coils are successively short-circuited as a commutator-brush passes from one segment to another. Since the armature-coils at the instant that they are short-circuited are traversed by an alternating flux, they become the seat of heavy induced currents, which result in poor commutation and lower the efficiency of the motor. In order to avoid these short-circuit currents, it has been proposed heretofore to provide the armature with a plurality of independent windings connected to successive commutator-segments and to employ brushes of a width insufficient to bridge adjacent segments connected to the same winding. By this arrangement the short-circuit currents are eliminated and the operation of the motor at starting and at low speeds is improved. This arrangement possesses a disadvantage at high speeds, however, since the circuit of one of the armature-windings is broken every time that a commutator-segment leaves a brush. At starting and at low speeds this objection is not serious, but at high speeds severe sparking may result from this cause.

The object of my invention is to provide a novel arrangement of armature-windings which possess to a marked degree the advantages obtained at low speeds with a plurality of independent windings without the disadvantage that has existed heretofore with such windings at high speeds.

My invention consists in providing the armature with a plurality of separate windings and connecting equipotential points on these windings to each other through suitable current-controlling devices and using brushes of a width insufficient to bridge adjacent segments connected to the same winding. In one form I employ resistances in these connections between the windings. With such an arrangement the resistances serve to prevent any heavy short-circuit currents from flowing at starting, while at high speeds, since the windings are connected in parallel at a plurality of points, only a portion of one of the windings is open-circuited when a commutator-segment leaves a brush. In place of resistances permanently connected to the windings I may employ other current-controlling devices, such as switches.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows diagrammatically an alternating-current motor with armature-windings arranged in accordance with my invention, and Fig. 2 shows a modified form of the same.

In the drawings, A represents the armature, which, for the sake of simplicity, is shown as a Gramme ring and which is provided with two separate windings. The two windings are connected to alternate segments of a commutator C. The commutator-brushes B B are of such a width that they do not bridge two adjacent segments connected to the same winding. In other words, they are not greater in width than the width of a commutator-segment.

F F represent the field-poles of the motor. It should be understood that this representation is entirely diagrammatic and that a field structure with or without projecting poles and with a distributed or concentrated field-winding may be employed in practice. Similarly, in actual construction the armature would preferably be of the drum type.

The two armature-windings are connected to each other at a number of equipotential points by impedances R, which are preferably non-inductive resistances. It will be seen that whatever short-circuit currents may flow, due to the brush bridging two adjacent segments connected, respectively, to the two windings, they must pass through one of the resistances R, and these resistances may be of sufficient size to keep the short-circuit currents within such limits that sparking is practically eliminated and the efficiency of the machine is not affected. Thus the cross connections between the windings do not diminish to any appreciable extent the advantage obtained by employing independ-

ent armature-windings. Moreover, at high speeds the commutation is very much better than could be obtained without the cross connections. When a commutator-segment leaves a brush, only so much of the winding to which that segment is connected is open-circuited as lies between the segment and the nearest cross connections. It is obvious that with such an arrangement the commutation is much better than when the entire circuit of one of the windings is broken every time a commutator-segment leaves a brush.

A different form of current-controlling device is shown in Fig. 2. In place of employing permanent cross connections with impedances included therein to limit the current-flow, switch-contacts may be inserted in these cross connections, so that at starting the two windings may be wholly independent, while at high speeds they may be connected directly to each other at a number of equipotential points. The switches may be controlled manually or automatically.

In Fig. 2 I have shown an arrangement of switches designed to be operated automatically by centrifugal force. The switches are indicated at S. When the motor is at rest, the switches are held against stops in the position shown by tension-springs *s*, but are provided with suitable weights, so that when the motor reaches a certain speed the switches are moved outwardly against the tension of the springs and close the connections between the two windings. Any other well-known type of automatic or manually-operated switch may be used in place of that shown.

Although I have shown an armature provided with only two windings, it is obvious that any desired number of separate windings may be employed. Whatever the number of windings they should be connected to successive commutator-segments, and the commutator-brushes should have a width insufficient to bridge adjacent segments connected to the same winding. As has been before stated, I have illustrated my invention diagrammatically for the sake of simplicity, and any well-known type of motor construction may be employed in carrying my invention into practice.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an alternating-current dynamo-electric machine, an armature having a plurality of separate windings connected to successive commutator-segments, connections between a plurality of equipotential points on said windings, and commutator-brushes of a width insufficient to bridge adjacent segments connected to the same winding.

2. In an alternating-current dynamo-electric machine, an armature having a plurality of separate windings connected to successive commutator-segments, connections between a plurality of equipotential points on said windings, current-controlling means in said connections, and commutator-brushes of a width insufficient to bridge adjacent segments connected to the same winding.

3. In an alternating-current dynamo-electric machine, an armature having a plurality of separate windings connected to successive commutator-segments, connections between a plurality of equipotential points on said windings, impedances inserted in said connections, and commutator-brushes of a width insufficient to bridge adjacent segments connected to the same winding.

4. In an alternating-current dynamo-electric machine, an armature having a plurality of separate windings connected to successive commutator-segments, connections between a plurality of equipotential points on said windings, non-inductive resistances inserted on said connections, and commutator-brushes of a width insufficient to bridge adjacent segments connected to the same winding.

In witness whereof I have hereunto set my hand this 5th day of May, 1905.

MARIUS C. A. LATOUR.

Witnesses:
HANSON C. COXE,
JACK BAKER.