(No Model.)

T. A. EDISON.

ELECTRICAL GENERATOR OR MOTOR.

No. 293,432. Patented Feb. 12, 1884.

Fig. 1.

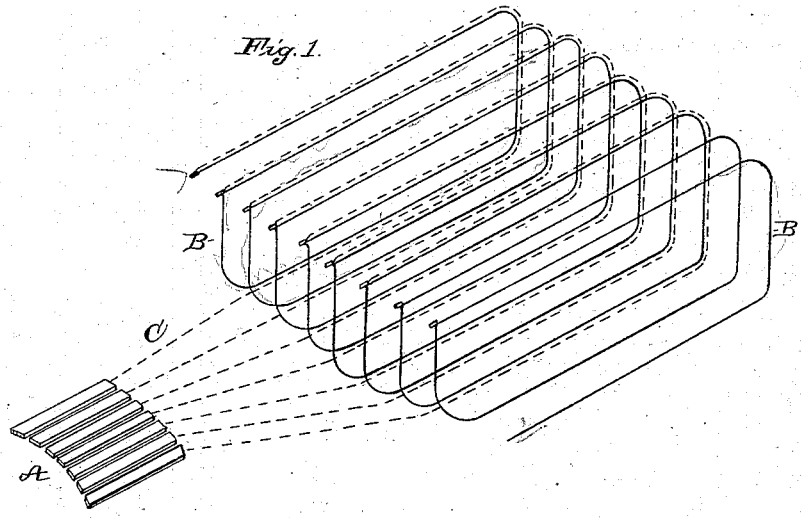


Fig. 2.

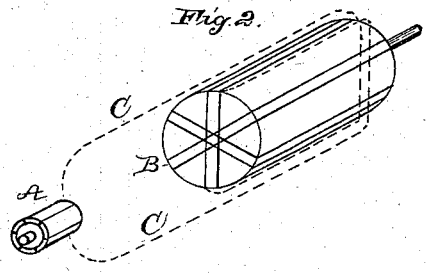
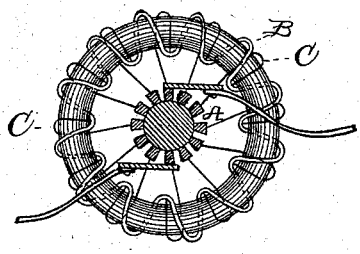


Fig. 3.



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THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

ELECTRICAL GENERATOR AND MOTOR.

SPECIFICATION forming part of Letters Patent No. 293,432, dated February 12, 1884.

Application filed October 18, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Electrical Generators and Motors, (Case No. 602,) of which the following is a specification.

This invention relates to the construction of dynamo-electric machines and electro-dynamic motors having continuously-wound bobbins connected at intervals to commutator-bars, whereby the sparking at the commutator will be greatly reduced or wholly obviated, overcoming the necessity for changing the current-collectors upon the commutator in accordance with variations in the load upon the machines when used either as generators or motors, increasing the capacity of the machine and decreasing the heat generated in the armature-coils, and also diminishing the wear of the commutators and the collectors. This I accomplish by opposing the electro-motive force of the coils as they are short-circuited at the commutator (by the bridging of commutator-bars by the current-collectors) by a counter electro-motive force. This counter electro-motive force is preferably equal or nearly equal to the electro-motive force of the short-circuited coils, in which case no current will flow in the short-circuited coils and the sparking will be completely obviated; or the counter force may be somewhat less or even greater than the direct force, but not sufficiently one way or the other to make the spark due to the current produced by the predominating electro-motive force of practical importance. The counter force is produced by making the connections between the bobbin and the commutator-bars through conductors which pass through the field of force, and in which there is a counter electro-motive force opposed to the direct force of the short-circuited coils. These connections are preferably in the form of loops upon the armature.

In machines with continuous windings, the commutator-bars have been heretofore connected with the armature-bobbin by conductors running directly from the commutator-bars to the bobbin. By this invention, however, each connection is made by a conductor which is connected to the bobbin, and is carried back on the armature-loop from the point of connection therewith, and follows it one or more times around the armature, and is then connected to a commutator-bar. The extra loops may be conductors of the same size as the bobbin; but much smaller conductors are preferably used, and since each extra loop is in circuit a portion of the time only, the heat due to the main current is dissipated. A counter force equal to the direct force is obtained by giving each extra loop the same length as one loop or section of loops of the main bobbin; or in constructions where this is not desirable the extra loops may be placed in advance of the loops of the main bobbin, so that as each main loop or section of loops is short-circuited the opposing extra loop or section of loops is in a stronger magnetic field, and in this way the counter force of the extra loop can be made equal or nearly equal to the direct force of the short-circuited loop.

This invention is applicable to all continuously-wound machines, whether of the Gramme, Siemens, or other type.

In the accompanying drawings, forming a part hereof, Figure 1 is a perspective view of a number of armature-loops removed from the armature and of a number of commutator-bars, the connections between the loops and bars being shown by dotted lines; Fig. 2, a perspective view of a wound armature of the Siemens type and a commutator with two commutator-connections illustrated; and Fig. 3, a side elevation of a wound armature of the Gramme type with the commutator in vertical section, all the commutator-connections being illustrated.

A represents commutator-bars, and B the coils or loops of a continuously-wound armature. The field-magnet, the location of which will be well understood, is not shown in any of the figures.

C represents the conductors connecting the loops with the commutator-bars. These conductors are wound as loops upon the armature, and hence pass through the field of force, and in them is developed a counter electro-motive force which neutralizes wholly or partially the electro-motive force of the coils as they are short-circuited. It will be seen that each conductor C, instead of extending from the point of connection with B directly to a commutator, is run back upon the coil B, to which it is connected, and follows that coil around the arma-

ture, and is then connected to a commutator-bar. If the winding B is a plural winding, each conductor C may also be wound two or more times around the armature. In Fig. 2 two connections only are shown for clearness; but it will be understood that the other commutator-bars will be connected in the same way with the armature-coils. In Fig. 3 the connections C pass once around the ring-armature before being connected with the commutator-bars; but these connections may be run two or more times around the armature, to give the required counter electro-motive force.

The operation is not dependent upon the resistance of the extra loops, but upon their length and position with reference to the corresponding main loops; and hence I make no claim herein to the interposition of an extra resistance between the commutator and the armature-coils. A construction dependent upon the resistance is described in my application Serial No. 114,282, and that invention is therein claimed. Neither do I claim herein a resistance external to the current-collectors forming a bridge of high resistance between the short-circuited commutator-bars, for this is claimed in my application Serial No. 114,281.

What I claim is—

1. The method of overcoming wholly or partially the spark at the commutators of dynamo or magneto electric machines or electro-dynamic motors, consisting in developing a counter electro-motive force opposed to the electro-motive force of the armature-coils as they are short-circuited, substantially as set forth.

2. In an electrical generator or motor, the combination, with the armature and commutator, of means for throwing a counter electro-motive force into the armature-coils as they are short-circuited, substantially as set forth.

3. In an electrical generator or motor, the combination, with the armature and commutator, of conductors connecting the armature-coils and commutator-bars and passing through the field of force, substantially as set forth.

4. In an electrical generator or motor, the combination, with the armature-coils and the commutator-bars, of extra loops wound upon the armature, and connecting the armature-coils and commutator-bars, substantially as set forth.

This specification signed and witnessed this 17th day of October, 1883.

THOS. A. EDISON.

Witnesses:

WM. H. MEADOWCROFT,

EDWARD H. PYATT.