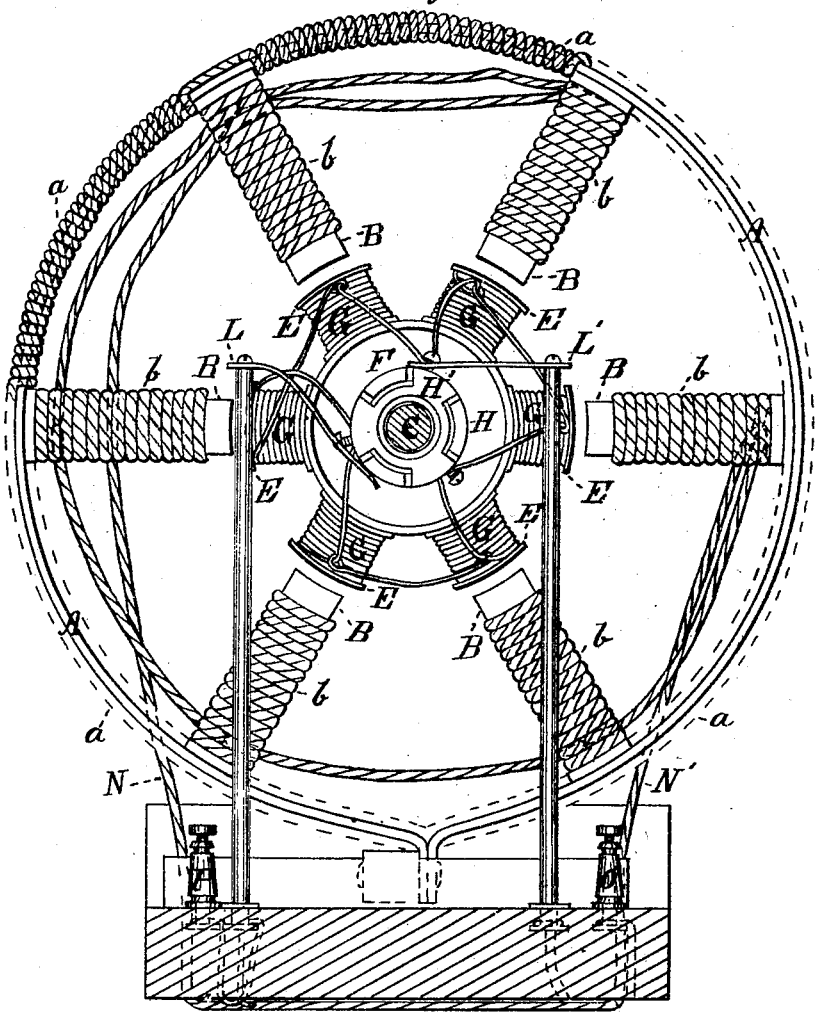
2 Sheets—Sheet 1.

E. WESTON.

MAGNETO ELECTRIC MACHINE.

No. 180,082. Patented July 18, 1876.

Fig. 1.



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MAGNETO-ELECTRIC MACHINE.

No. 180,082. Patented July 18, 1876.

Fig. 2.

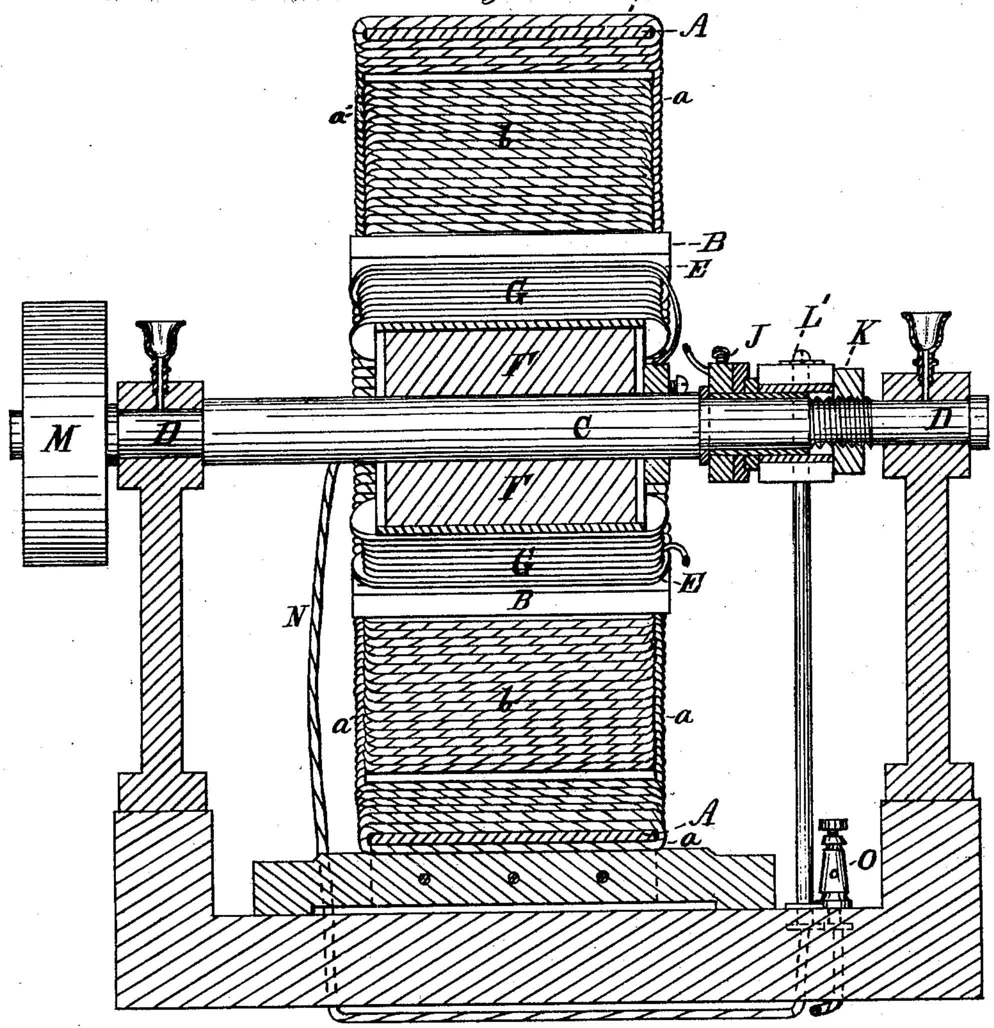


Fig. 4.

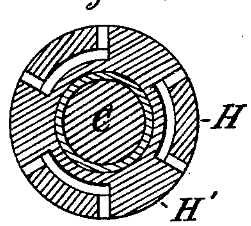
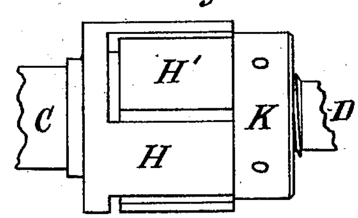


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN MAGNETO-ELECTRIC MACHINES.

Specification forming part of Letters Patent No. **180,082**, dated July 18, 1876; application filed April 4, 1876.

To all whom it may concern:

Be it known that I, EDWARD WESTON, of Newark, New Jersey, have invented certain new and useful Improvements in Magneto-Electric or Dynamo-Electric Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, and in which—

Figure I is an end view of my machine. Fig. II is a vertical cross-section through the center, from end to end. Fig. III is an enlarged side view of the commutator. Fig. IV is a transverse cross-section through the same.

My invention consists in improvements in that class of electrical machines in which the power from an engine or other motor is utilized and transformed into electricity, such machines being generally called "magneto-electric machines." It further embodies in it the discovery made by Wheatstone of the principle of mutual accumulation—that is, the current generated by the revolving armatures is used to excite a stationary magnet, the latter being in circuit with the current from the armature; but such discovery was only practically applied in machines when one electro-magnet was used, or else, where a number of electro-magnets were used, the current from only a portion of the whole number of revolving armatures was used to excite the electro-magnets, the remainder being used for any desired purpose, thus making a machine in which there were, practically, two circuits.

In my improved machine the currents generated in a number of revolving armatures are passed through the stationary magnets, involving a peculiar construction, differing widely from that adopted in the machines which, up to the present time, have utilized the discovery of Wheatstone.

An iron ring or cylinder, A, is properly supported, the size of the ring depending upon the size of the machine. From the interior of this ring a number of radially-projecting magnets, B B B B, are arranged, all pointing toward a common center, which magnets I prefer to make broad transversely and short radially. The magnets B B B B are wrapped or wound with wire or ribbons *b b b b*, in the manner usually employed in making electro-magnets; and I may also wrap in the same way the ring or cylinder A, to which the magnets are connected, as at *a a a a*, such wrapping increasing the effectiveness of my apparatus and adding to its power. In the central space left between the inward ends of the magnets B B B there is arranged a shaft, C, carried by suitable bearings, D D, and having upon such portion of it as is within the ring or cylinder A a series of armatures, E E E E, all connected to an iron hub or center, F. The armatures are of iron, and are also wrapped with wire or with ribbons of metal, as at G G G G. The outwardly-projecting ends of these armatures E E are so arranged as that when they are simultaneously revolved by the turning of the shaft C their outwardly-projecting ends will pass closely, but without touching the inwardly-projecting ends of the magnets B B B B. Thus, when the shaft C is revolved, carrying the armatures E E E E very rapidly past the electro-magnets B B B B, currents of electricity will be induced in the wires surrounding the armatures; but as such currents are constantly changing in each armature from positive to negative, the well-known device called a "commutator" or "pole-changer" has to be used. Such commutators or pole-changers, when used in connection with a number of revolving armatures, have heretofore been constructed with the requisite number of separate insulated strips, and with an equivalent number of springs or brushes, half of which number are, or always should be, in connection with the armatures having the negative or positive electricity, as the case may be, at the same moment, and the currents transmitted by each spring is sent to the binding-post or screw-cup; or the currents from the various springs join before reaching the screw-cup or binding-post.

Commutators have always been provided with as many springs or brushes as there are strips, which is a cause of loss, for the connection made is not always perfect, and the metal is soon destroyed by the action of the current, or worn away, thus necessitating a frequent renewal or adjustment.

In my improved form of commutator (seen at H H) all the strips which convey currents of like kinds are united in the commutator it-

self, and, therefore, it is only necessary to use the springs or brushes to collect the currents from all the armatures, no matter how many magnets or armatures may be employed.

My pole-changer or commutator is made in two parts, H and H′. One part, H, is slipped upon the shaft C, but is perfectly insulated from it, and also from the other part, H′, of the commutator, both parts revolving with the shaft on which they are mounted. An adjustable clamping-ring, J, is placed upon the shaft, and serves as an abutment at one end, while a nut, K, is screwed on the shaft at the other end, and serves to keep the two parts of the apparatus together. Each part is constructed as shown in the drawing. The number of projecting pieces which enter into spaces formed in the other half, but which do not touch or make in any way a metallic connection between the halves H and H′, correspond with the number of rotating magnets forming the armature.

Only two springs or brushes are required with this form of commutator, as seen at L and L′. One is always in connection with one of the projecting pieces of the one half, while the other is always in connection with the other half of the commutator, one spring always carrying or transmitting the positive currents, while the other transmits the negative current.

The operation of my machinery is as follows: When the apparatus is first made the stationary electro-magnets are for a moment put in connection with a battery or other source of electricity, and after this they always retain a small amount of residual magnetism. The belt from the engine, for example, being put upon the pulley M, the armatures are put in rapid revolution, and a weak current of electricity is produced, which, flowing through first one half of the commutator, and then the other half, as the case may be, is passed through suitably-arranged connecting wires N N′ to the coils *b b*, which surround the magnets B B B B, and, if desired, through the coils *a a*, surrounding the iron ring A. This circuit, small at first, will rapidly excite the magnets B B B B, producing the maximum effect. The current, after passing through the coils *b b b* and *a a a*, flows through any desired circuit, the wire being led from the screw-cup O. Then, to complete the circuit, it returns to the machine at the screw-cup P, up through the spring or brush L, into first one half of the commutator, and then into the other, as the case may be, completing, in this way, the circuit from the coils G, surrounding the revolving armatures E E E, then back again to these coils, having, during its passage, been utilized for any purpose to which electricity is or may be applied, and in its passage exciting the stationary electro-magnets B B B.

One-half of the number of coils which compose the armature are connected with, for example, the part H of the commutator, and the remainder with the part H′ of the commutator, for half of the separately-wrapped armatures are positive and the other half negative, alternately.

Such arrangements are well known and need no description. The size of wire or ribbon used, the speed of revolution of the armature, and the coils G G G G G should bear approximately certain relations one to the other; but as such matters do not enter into any part of my invention, and are within the knowledge of those having to do with electrical apparatus, I will not enter into detail explanations.

It is to be specially observed, as it is a part of my invention, that the entire current generated in or by all the coils G G G G G of the revolving armature is passed through the coils surrounding the magnets B B B B, and the coil surrounding the ring or cylinder A, and that none of the armatures are set apart specially for the purpose of generating a current whose sole duty it shall be to excite the magnets B B B B.

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

1. In a magneto-electric machine, a ring of iron or other magnetic material, wrapped or unwrapped, having radially-projecting magnets attached to or forming a part of such ring.

2. In a magneto-electric machine having but one circuit, the combination of a ring of iron or other magnetic material, wrapped or unwrapped, and having a series of radially-projecting magnets attached to or forming a part of such ring, with a hub or center of iron or other material, having projecting from it a series of wrapped armatures attached to or forming a part of such hub.

3. A magneto-electric machine with radially-projecting electro-magnets and radially-projecting armatures, when arranged so that the current generated in all the armatures is passed around the radially-projecting electro-magnets, substantially as and for the purposes set forth.

4. The commutator H H′, made in two parts, as described, placed upon the shaft C, the clamping-ring J, and nut K, all constructed substantially as and for the purposes set forth.

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Witnesses:

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