

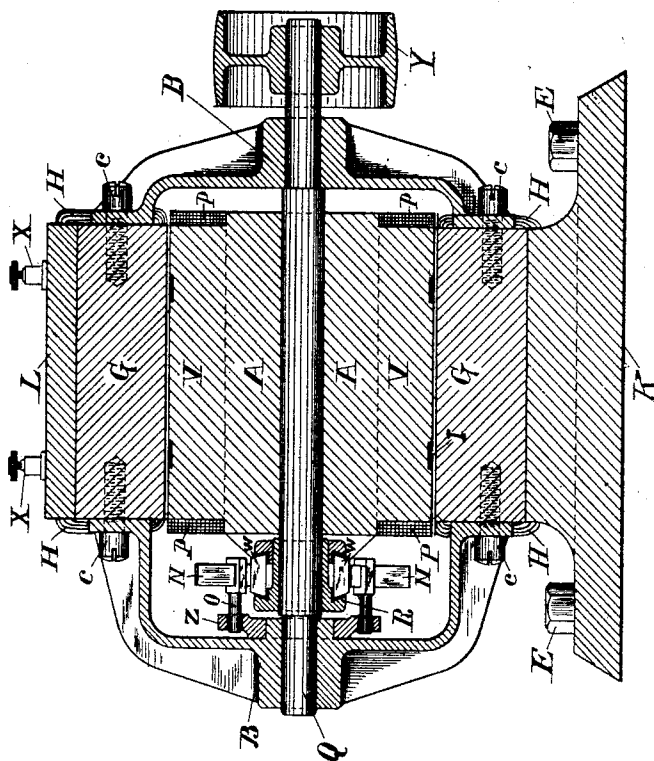
(No Model.)

H. P. WHITE.
ROTARY ELECTRO MAGNETIC ENGINE.

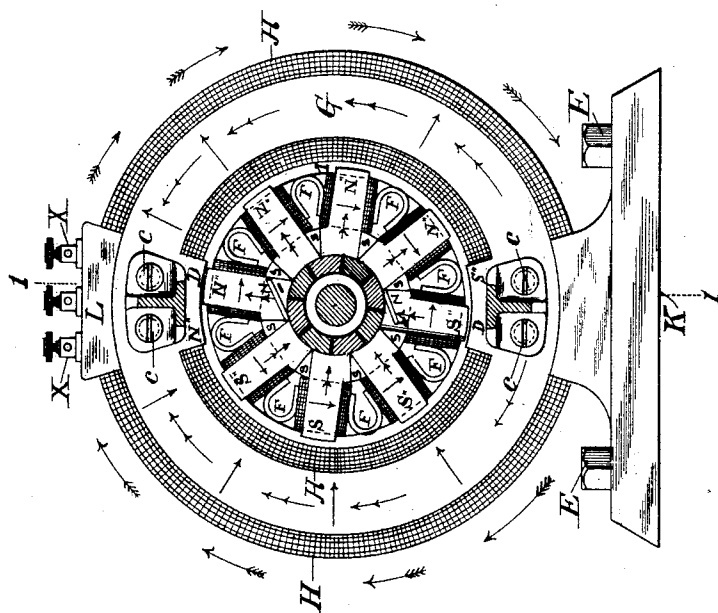
No. 511,570.

Patented Dec. 26, 1893.

— Fig. 2 —



— Fig. 1 —



WITNESSES:

W. H. Brighton

R. S. Robertson

Henry Parker White INVENTOR

BY Chapin & Denny

his ATTORNEYS.

UNITED STATES PATENT OFFICE.

HENRY PARKER WHITE, OF KALAMAZOO, MICHIGAN.

ROTARY ELECTRO-MAGNETIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 511,570, dated December 26, 1893.

Application filed February 15, 1893. Serial No. 462,482. (No model.)

To all whom it may concern:

Be it known that I, HENRY PARKER WHITE, a citizen of the United States, residing at Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Rotary Electro-Magnetic Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in rotary electro-magnetic engines.

The object of my invention is to provide a rotary electro-magnetic engine having a multipolar armature so wound, constructed and arranged between the open poles of a double limb ring field magnet, as to be rotated upon its axis by the combined forces of elementary magnetic attraction and repulsion, and also that force exerted by the tendency of a magnetic pole to move past an electrified wire.

The object of my invention is also to provide a rotary electro-magnetic engine whose multipolar armature wound and constructed as above described is encircled by a double limb ring field magnet having at diametrically opposite points of its inside surface polar projections which extend from the inside surface to points about even with said surface of said field magnet's coils; thus forming in conjunction with said coils a completely closed circle around said armature, which having its points of electric commutation located within the zone of said field magnet's polar projections, will always present to each pole of said field magnet one projection of north polarity, and one projection of south polarity and as the principle of winding the wire upon said armature secures north polar magnetism to one half of its polar projections, and south polar magnetism to the other half, it follows that each pole of said field magnet is constantly attracting and repelling the poles of said armature, and the magnetized poles of said armature are constantly exerting themselves to move past the electrified coils of said field magnet; which forces all tending in one direction will combine to

form the efficient mechanical force of my rotary electro magnetic engine.

My invention consists of the novel construction and combination of the several parts as will be hereinafter set forth and particularly pointed out in the claims.

The object of my invention as above set forth, is accomplished by the mechanism illustrated in the accompanying drawings forming part of this specification, in which similar letters of reference indicate corresponding parts in both views.

Figure 1 is an end view of my rotary electro-magnetic engine having the central portion of the bearing casting broken away to show the armature A in full, and also to show the armature coils P and the folds H in section. Fig. 2 is a longitudinal vertical section of my improvement on the dotted line I—I, in Fig. 1, having the brushes N, N, drawn back through the receiving rods O, O, to show each brush in full.

Referring now to the drawings, the cylindrical armature A constructed of any proper highly magnetic substance, is provided upon its outer convex surface with any desired number of polar projections V as seen in Figs. 1 and 2. The said projecting pole pieces are preferably laminated but they may consist, with the body of the armature, of one unbroken body of metal. The armature coils P, as seen in Figs. 1 and 2, are wound upon said projecting pole pieces V, each polar projection carrying one complete coil, which is wound upon it in the usual manner of winding magnets, viz: by first fastening one end of the wire to one of the conducting plates W of the commutator R; wind the said wire upon one of the projecting poles V of the armature A until said pole has received as many wire turns as is desired for one coil of the armature; then remove the insulation from the wire at the proper point and connect it to the next conducting plate W of the commutator R as seen at S in Fig. 1; then wind the next polar projection V of said armature A in the same manner, with the caution that the said wire passes around the pole in the same direction; and in the above manner wind all the polar projections V of the armature A properly connected with the con-

ducting plates W of said commutator R, and after winding the last pole of said armature connect the end of the wire with the conducting plate W which received the beginning wire, thus forming the armature coils in an endless wire.

From the above manner of winding it follows that the electric current in its passage around the armature A from the brush connection N+ to the brush connection N-, will have to flow in an opposite direction through the adjoining halves of all the coils as shown by the single head arrows, Fig. 1 which indicates the direction in which the electric currents flow, and consequently the coils have a tendency to neutralize the magnetic effect of each other. To obviate this difficulty a thin sheet of magnetic material is bent in the form of a hollow wedge having a circular head with its two ends terminating at its point, and is inserted between each of the adjoining coils of said armature A as seen at F in Fig. 1. The said circular head hollow wedges F and the said armature coils P are held in proper position by the binding wires I Figs. 1 and 2, which pass around the armature and are rigidly secured in a well known manner. The armature A is then mounted in the usual manner upon a suitable revoluble shaft Q which shaft is properly journaled in the bearing castings B and B, constructed of suitable diamagnetic material and rigidly secured to the field magnet G at either extremity by means of the cap screws C, C, C, C, in a well known manner as seen in Fig. 1.

The field magnet G as seen in Figs. 1 and 2 is a ring of proper size, strength and material, having diametrically opposite centripetal polar projections D, D, said projecting poles preferably extending beyond the inner surface of said field magnet G to about the same distance occupied by the field coils H; thus forming in connection with the said field coils a completely closed circle around the armature A as seen in Fig. 1. The field coils H, H, may be if desired, either wound with fine wire and shunted, or wound with coarse wire and coupled in series with the armature A, but in either case the last layer of wire on the said coils H, H, should lie about on a line with the surface of the polar projections D, D, of the field magnet G. The said field magnet will thus avoid all objectionable corners in the construction, and will have the shortest possible magnetic orbit in a position natural to the magnetic curves; and the said field coils H, H, from the nature of their position will be made to perform the double office or function of magnetizing the field magnet G, and also of inducing the magnetized polar projections of the armature A to move past the electrified wires of said coils in a given direction according to the laws of electro-magnetic induction. A brush rack Z is se-

cured in the usual manner upon the bearing castings B as seen in Fig. 2; said brush rack being properly insulated from the receiving rods O, O, which support the brushes N and N, in their proper position against the commutator R, in a well known manner.

The commutator R, of any approved construction, is mounted in the usual manner on the armature shaft Q. The pulley Y seen in Fig. 2 or other suitable device may be used as a convenient delivering medium for the force of my machine.

In Fig. 1 the single head arrows $\rightarrow$ indicate the direction of the electric currents in the armature and field coils, as arranged in my construction above described. The double headed arrows $\longleftrightarrow$ indicate the paths and direction of the magnetic lines of force through the same; N'' and S'' indicate the respective points of difference of magnetic potential, and the feathered arrows $\rightarrow$ indicate the direction in which the armature A would turn under the above conditions.

It will readily be seen in the above construction that by causing the polar projections of said armature to pass as near the polar projections of said field magnet as is consistent with the armature's free rotation, I not only secure the largest per cent. possible of the elementary force of magnetic attraction and repulsion which is exerted between the extreme points of said polar projections, but from the position of the field coils H, H, it follows that the magnetic polar projections of said armature will receive from said field coils an impulse to move past said field coils electrified wires in a given direction according to the laws of electro-magnetic induction.

As the electric currents in the armature coils flow at the points of commutation in the same direction through the adjoining halves of the four brush connected coils, it follows since said point of commutation is located within the zone of said field magnet's polar projections, that the electrified wires in the adjoining halves of said four brush connected coils will also receive an impulse from the polar projection of said field magnet to move past said field magnet's polar projections in a given direction according to the well known laws of electro-magnetic induction.

By referring to Fig. 1 it will readily be seen that in the above described construction, the several sources of force are all tending in one direction and consequently will be united upon the pulley Y, or other delivering medium of the machine, in a multipotent state of efficient mechanical force.

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

1. In a rotary electro magnetic engine, the combination of a multipolar armature magnet and its proper coils, with a proper number of circular head hollow wedges of mag-

netic material interposed between said armature's adjoining coils for the purpose and in the manner above set forth and described.

2. In a rotary electro-magnetic engine, the
5 combination of a double limb ring field magnet having diametrically opposite centripetal polar projections and its proper coils with a multipolar armature magnet and its proper
10 coils, in combination with circular head holes wedges of magnetic material interposed

between said armature coils, all constructed and arranged substantially as hereinbefore set forth and described.

Signed by me this 10th day of February, 1893.

HENRY PARKER WHITE.

Witnesses:

ADELBERT D. HARRIS,
GEO. W. MONTGOMERY.