(No Model.)

F. K. FITCH.

DYNAMO ELECTRIC MACHINE.

No. 285,249. Patented Sept. 18, 1883.

Fig. 1.

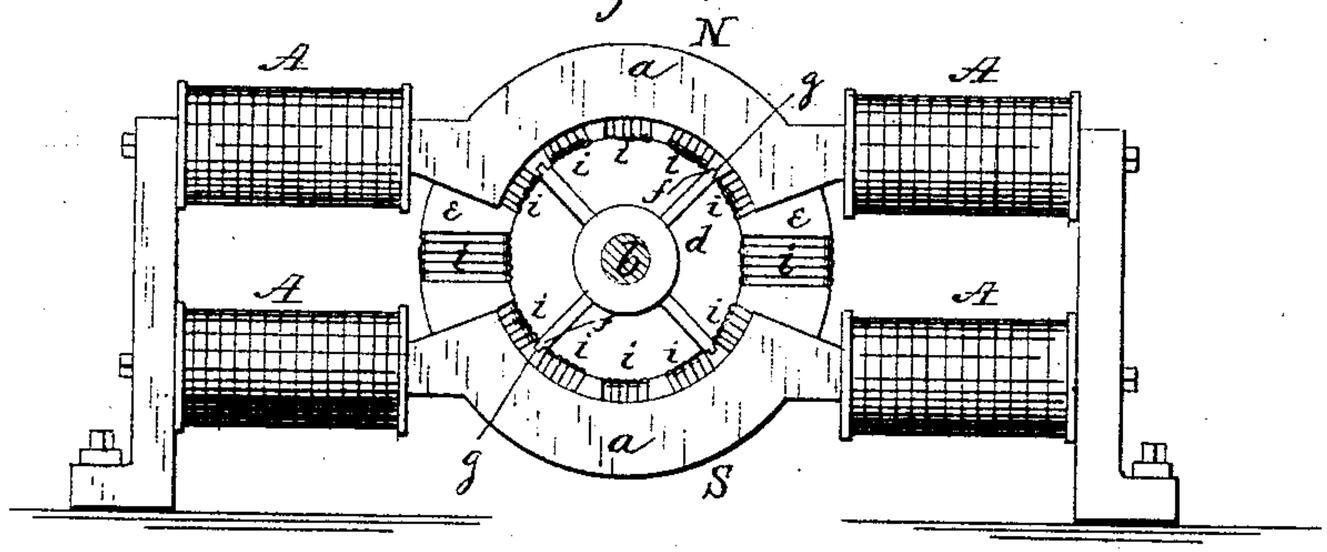


Fig. 2.

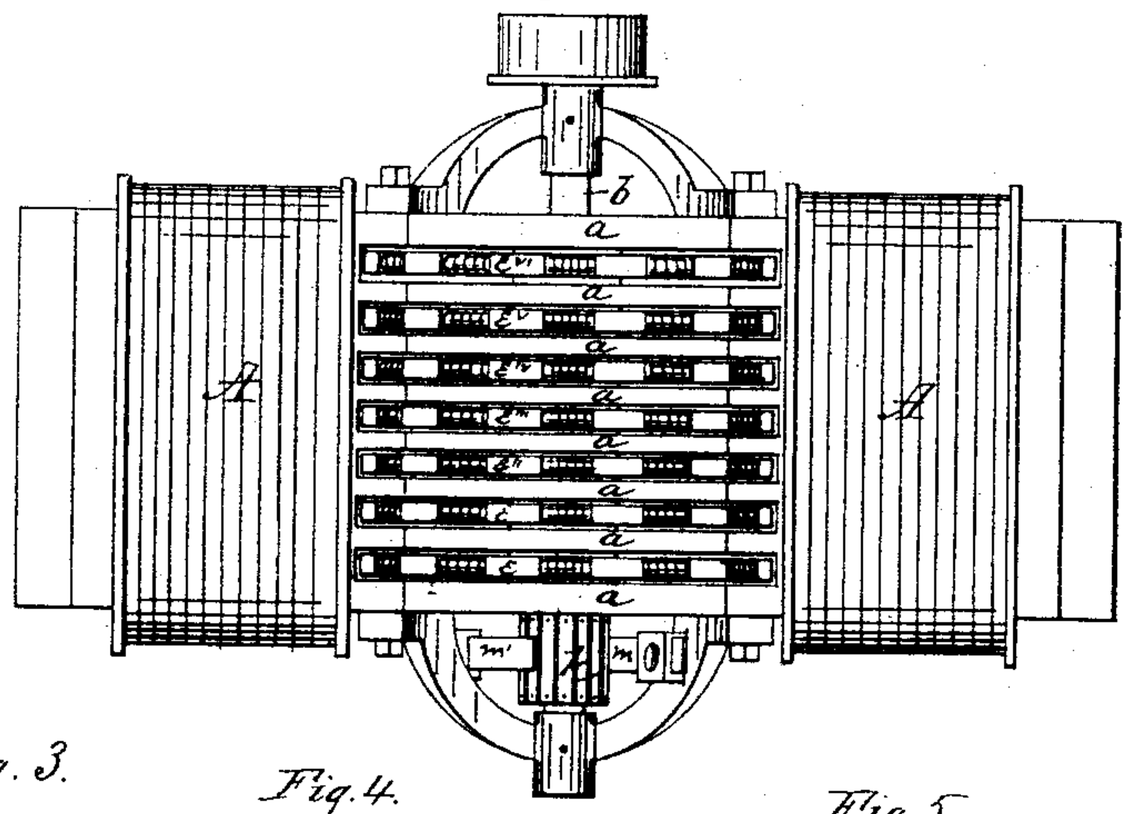


Fig. 3.

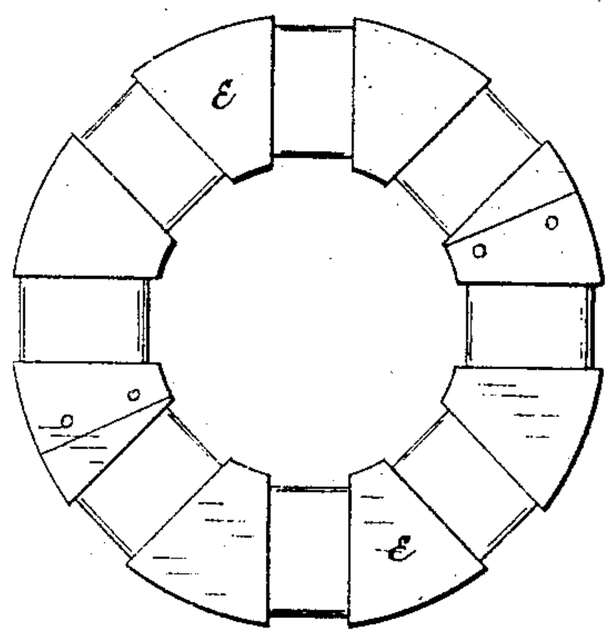


Fig. 4.

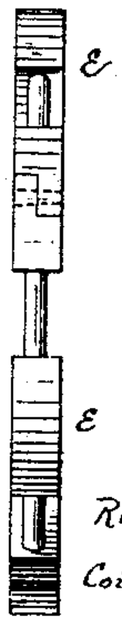


Fig 5.

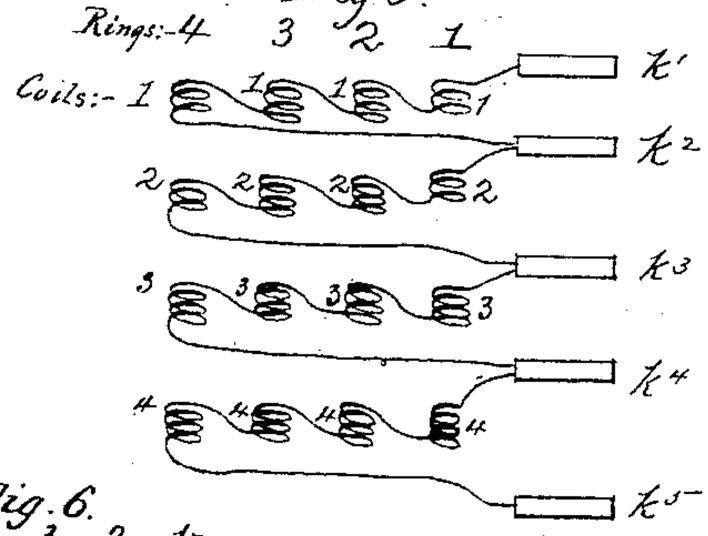
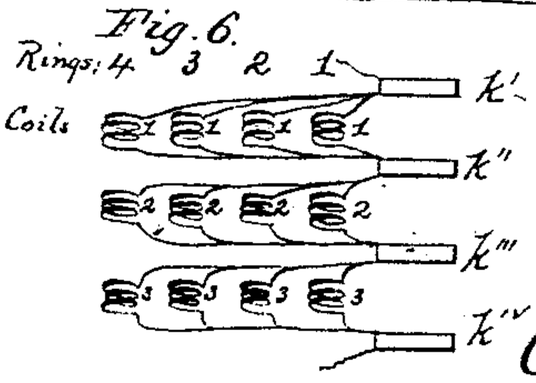


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERICK K. FITCH, OF NEW YORK, N. Y., ASSIGNOR TO THE FITCH ELECTRIC LIGHTING AND CONSTRUCTION COMPANY, OF NEW YORK.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 285,249, dated September 18, 1883.

Application filed January 17, 1883. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK K. FITCH, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines; 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 a part of this specification, in which—

Figure 1 is an end elevation with bearings and commutator removed. Fig. 2 is a plan view. Figs. 3 and 4 are respectively a face view and edge view of one armature-ring, showing form and construction. Fig. 5 is a graphic diagram of the mode of connecting the armature-coils. Fig. 6 is another mode of connection.

The object of this invention is to facilitate the construction of the armature of a dynamo-electric machine, to so arrange the armature and field-magnets that a very intense field of force will be afforded, and through which by my construction a very large aggregate of armature-conductor can be passed at right angles to the lines of force, in which the weight of the armature shall be very little compared to the current generated.

To these and other ends my invention consists in the construction, arrangement, and combination of parts, substantially as hereinafter fully described and claimed.

Briefly, one of the chief characteristics of my machine is the armature and its relation to the fields of force. I construct the armature of a number of thin iron rings wider radially than thick, mount these at intervals on a central shaft, and revolve them so that each ring revolves in slots in the pole-pieces of the field-magnets. This gives rise to many advantages, as will be seen.

In the drawings, A represents the inducing-coils of the field-magnets, whose cores, solid or sectional, are so produced as to form arched pole-pieces made up of the parallel bars *a*, having intervening slots, as shown by Fig. 2. In the slots thus formed the respective armature-rings rotate and are arranged as follows: The shaft *b* is journaled in any suitable manner—in the present case in the arched journal-bearings C C at the respective ends bolted to the field-magnets. Upon shaft *b*, I place a single long spider, *d d*, or as many short spiders as there are rings in the armature. Each of the rings is in turn fitted upon the shaft by means of the spider *d*. The ring is made in two halves, *e e*, (see Figs. 3 and 4,) with overlapping junctions, and bolted or riveted together, as shown. The ring is radially grooved, and in its general form is similar to the well-known Pacinotti ring, and the radial grooves are each wound similarly with insulated wire *i* until full, as in Fig. 1, the direction of winding being always the same. The ring *e e* is conveniently fitted to the spider by forming radial tenons *f* on the latter and grooves *g* on the inner edge of the ring, as shown by Fig. 1, the ring then being slipped or driven on the spider. The several rings *e e' e''*, &c., are spaced apart so that they will correspond to and enter the slots in the pole-pieces *a*.

In the drawings, Fig. 2, the pole-pieces are each composed of eight parallel bars, *a*, having seven intervening parallel slots. The armature therefore is made up of seven narrow rings, *e e'*, &c., all set alike with reference to their coils—*i. e.*, all the coils numbered 1 are in line parallel with the shaft, as are all coils numbered 2, and so on.

The collecting-cylinder *k* is of the usual cylindrical form, having as many parallel segments as there are coils *i* on a ring. The coils *i* of all the rings are connected up in either of two ways. For currents of high electro-motive force and small volume I proceed as illustrated in Fig. 5. The first end of coil 1 on ring 1 is connected to the segment *k'* of the collector, and the last end of the same coil is connected to the first end of coil 1 on ring 2, whose last end is likewise connected to the first end of coil 1 on ring 3, whose last end is likewise connected to the first end of coil 1 on ring 4, and the last end of the latter is connected to segment k^2 of the collector. The first end of coil 2 of ring 1 is connected to the same segment, k^2, and after *seriatim* connection of all coils 2 of the rings the last end is brought to segment k^3, and so on until the last end of the last

coil of the last ring is brought to the first segment, k', of the collecting-cylinder. Two diametrically-opposite brushes, $m\,m'$, are suitably mounted to take off the currents, which of course will be in a common direction in an external circuit.

For currents of low electro-motive force and large volume the coupling will be as in Fig. 6. The first end of all the coils No. 1 of all the rings will be connected in common to the segment k' and the last ends to the segment k''. The first ends of all coils No. 2 of all the rings will connect in common to segment k'' and their last ends to segment k''', and so on, the arrangement of brushes being as before.

Among others the following advantages arise from my construction: For a given weight of armature a very great length of utilizable conductor is available. The rings being separable into two parts, the winding is extremely easy, and for the same reason a defective coil can be unwound and rewound with great facility and dispatch without waste of good wire. Room is afforded for free circulation of air, and the parts will be kept cool. The armature-core being divided into separate rings, and each revolving in its own field-slots, the core of each will be the seat of induced magnetism on both sides independently, and the conductor thereon will on each side rotate in a most powerful field of force and in a very narrow compass. For machines of different capacities there need not be a great variety of sizes as to diameters, since the armature may be prolonged by adding on more rings instead of increasing their diameter. The rings, being thin, will easily discharge their magnetism and not become highly heated.

The field-coils A may be coupled in series in the circuit or in a derived circuit, or they may be energized by a separate source of current.

The slotted form of the field-magnet poles may be secured by constructing the cores of the field-magnets of parallel bars suitably distanced apart laterally.

I claim as my invention—

1. In a dynamo or magneto electric machine, a rotary armature composed of two or more narrow rings, each wound with separate coils of insulated conductor, said coils being arranged in rows parallel to the axis, in combination with a collecting-cylinder composed of as many segments as there are coils in one ring, all the coils in each of said rows being connected *seriatim* or in multiple arc with their respective ends to two adjoining segments of the collector, substantially as described.

2. In a dynamo or magneto electric machine, the combination of an armature composed of two or more rings, each wound with separate coils of conductor, and a field-magnet slotted so as to overlap said rings, substantially as described.

3. The armature-ring composed of two semicircular portions, adapted to be joined together, substantially as described, whereby the two portions can be wound with wire and afterward joined.

4. The armature-ring composed of the two radially-slotted semicircles *e e*, having their ends overlapping and secured by bolts or rivets, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

FREDERICK K. FITCH.

Witnesses:
SAML. R. DUMMER,
JOSEPH T. MURRAY.