(No Model.) 2 Sheets—Sheet 1.

W. P. WIEMANN.

DYNAMO ELECTRIC MACHINE.

No. 465,104. Patented Dec. 15, 1891.

Fig. 1

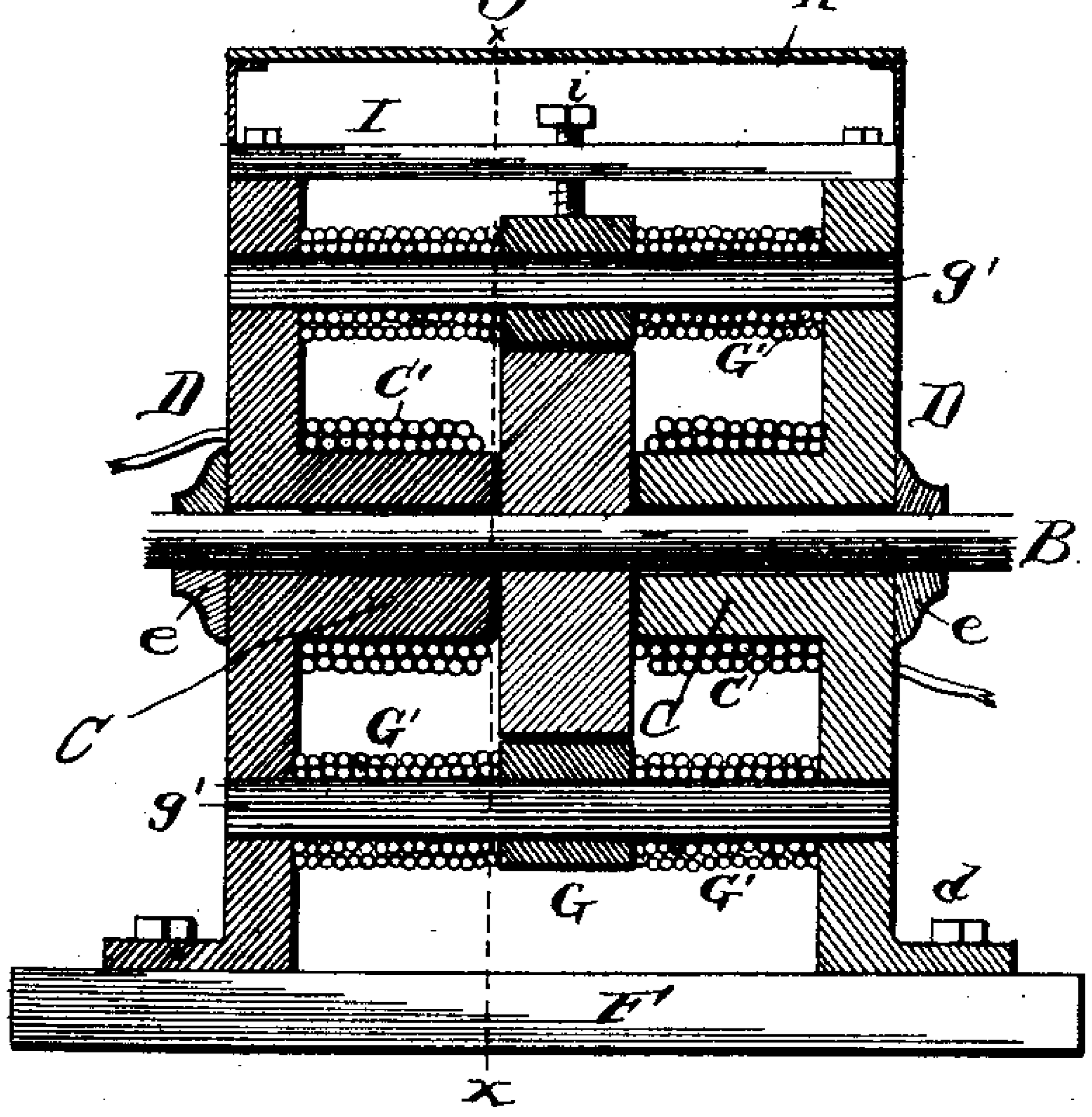


Fig. 2.

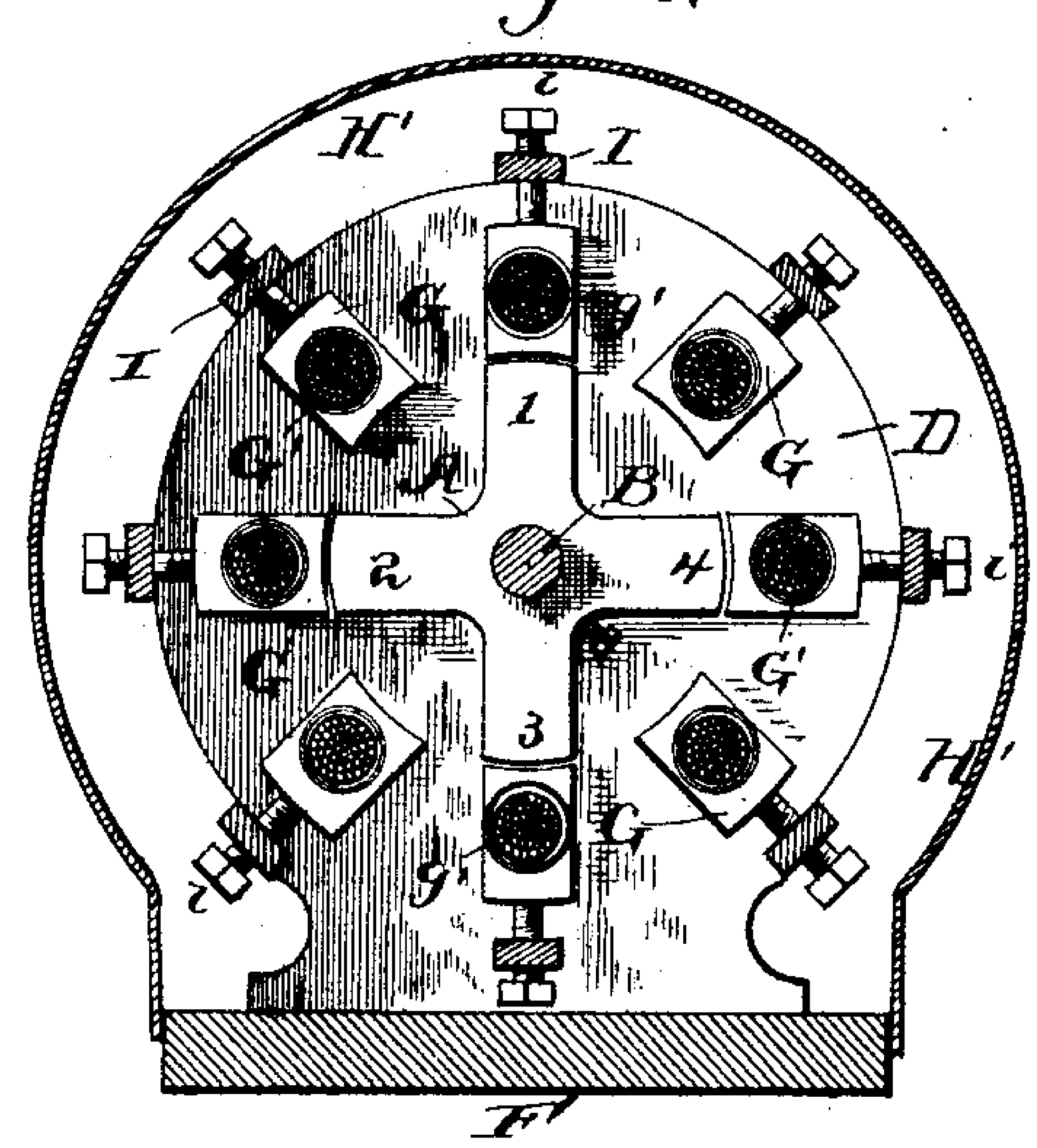


Fig. 3

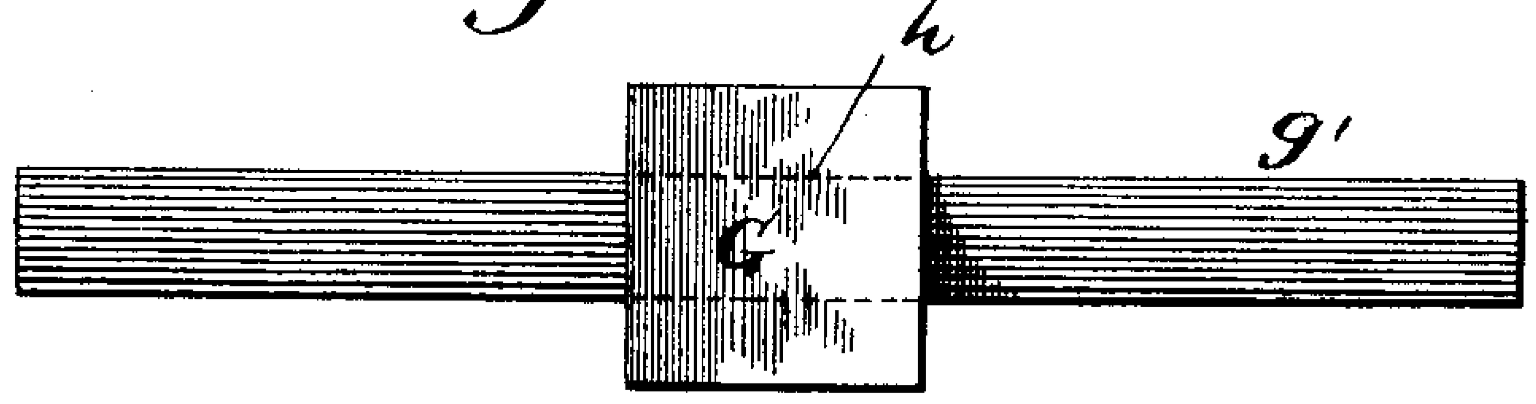


Fig. 4

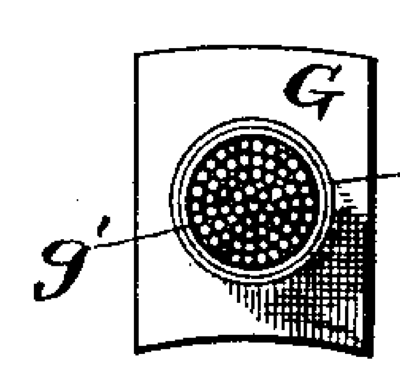


Fig. 6

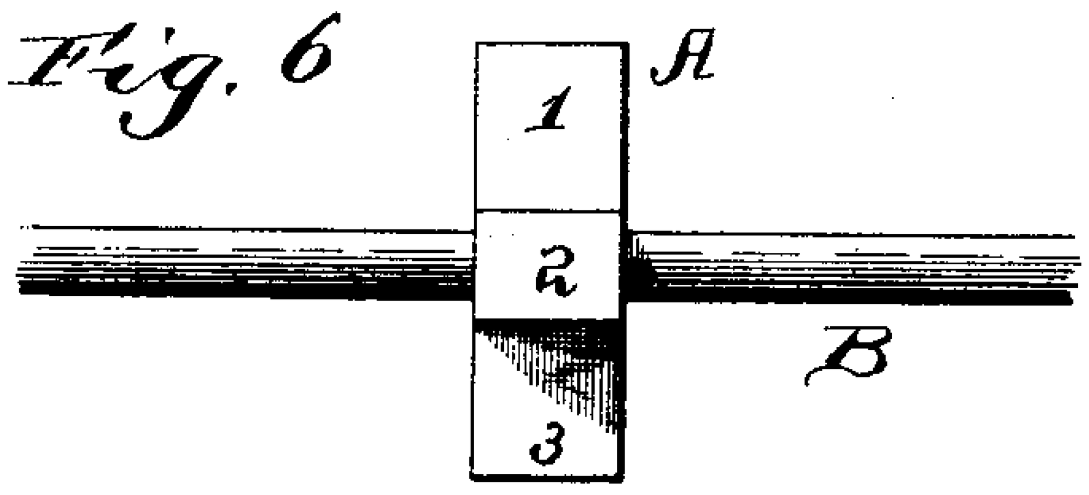
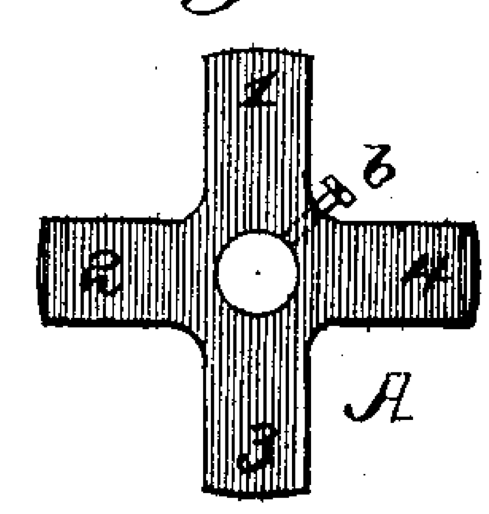


Fig. 7.



Witnesses:
J. B. McGirr.
W. F. Prukhard

Inventor,
William P. Wiemann
By his Attorneys,
Edson Bros.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. P. WIEMANN.

DYNAMO ELECTRIC MACHINE.

No. 465,104. Patented Dec. 15, 1891.

Fig. 5

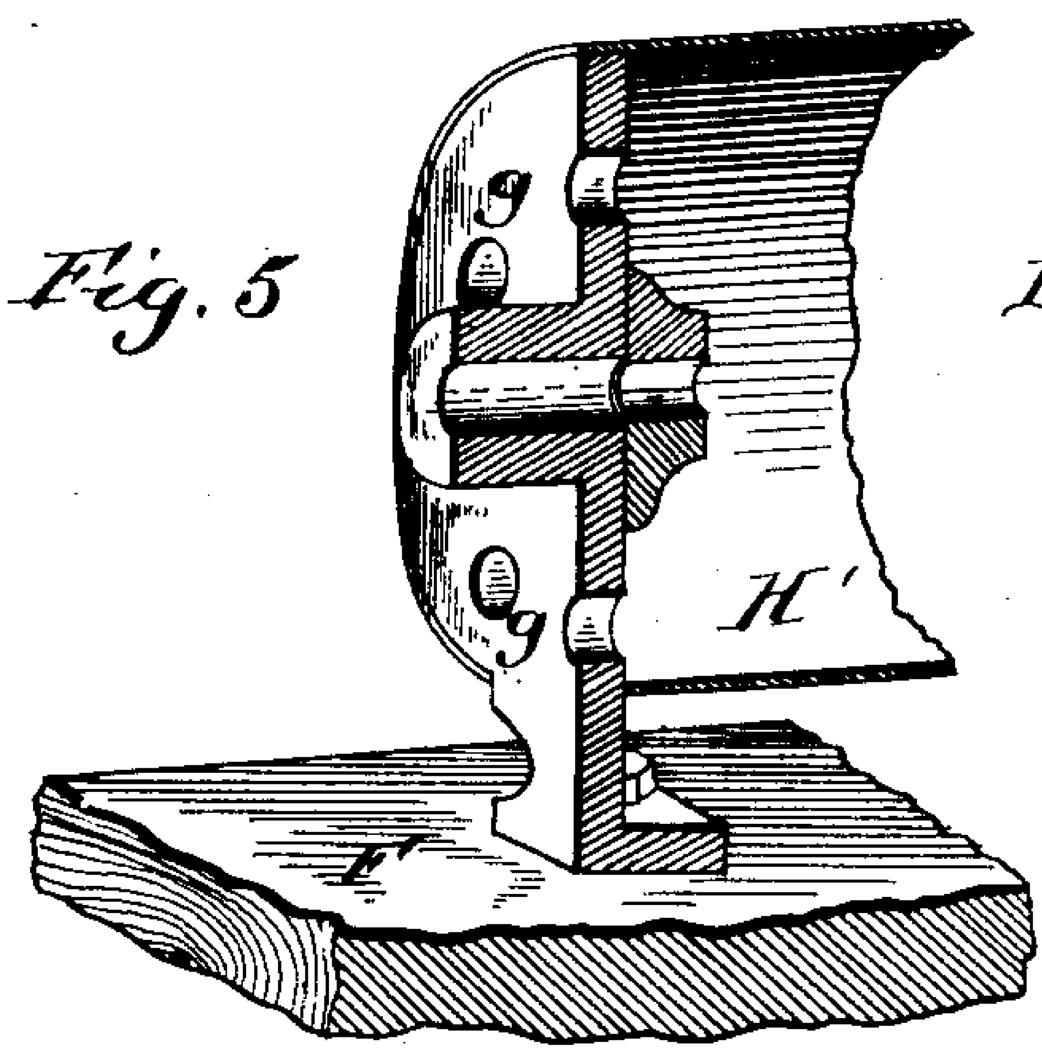


Fig. 8

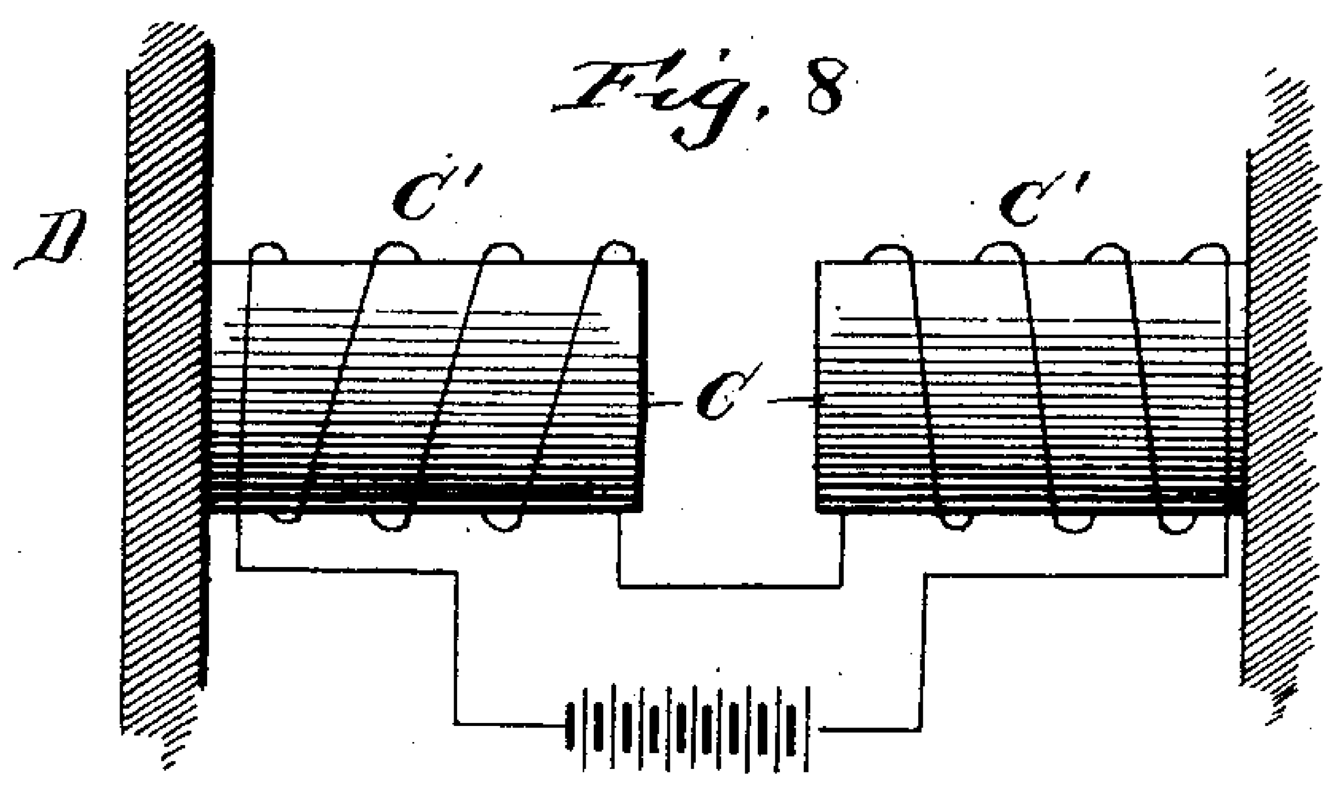


Fig. 9

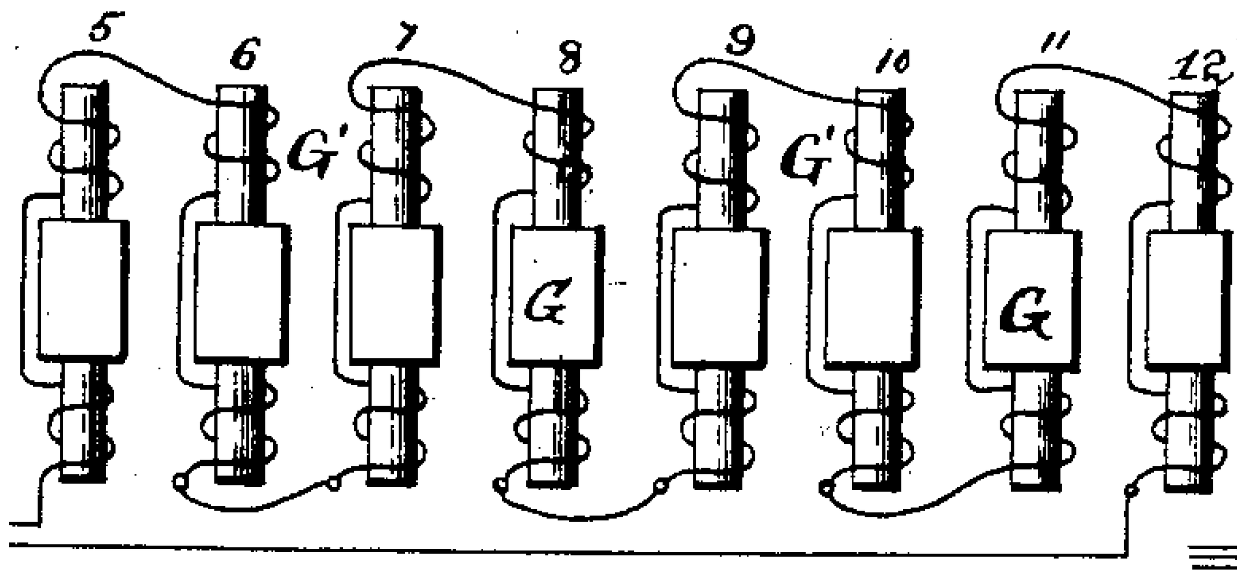
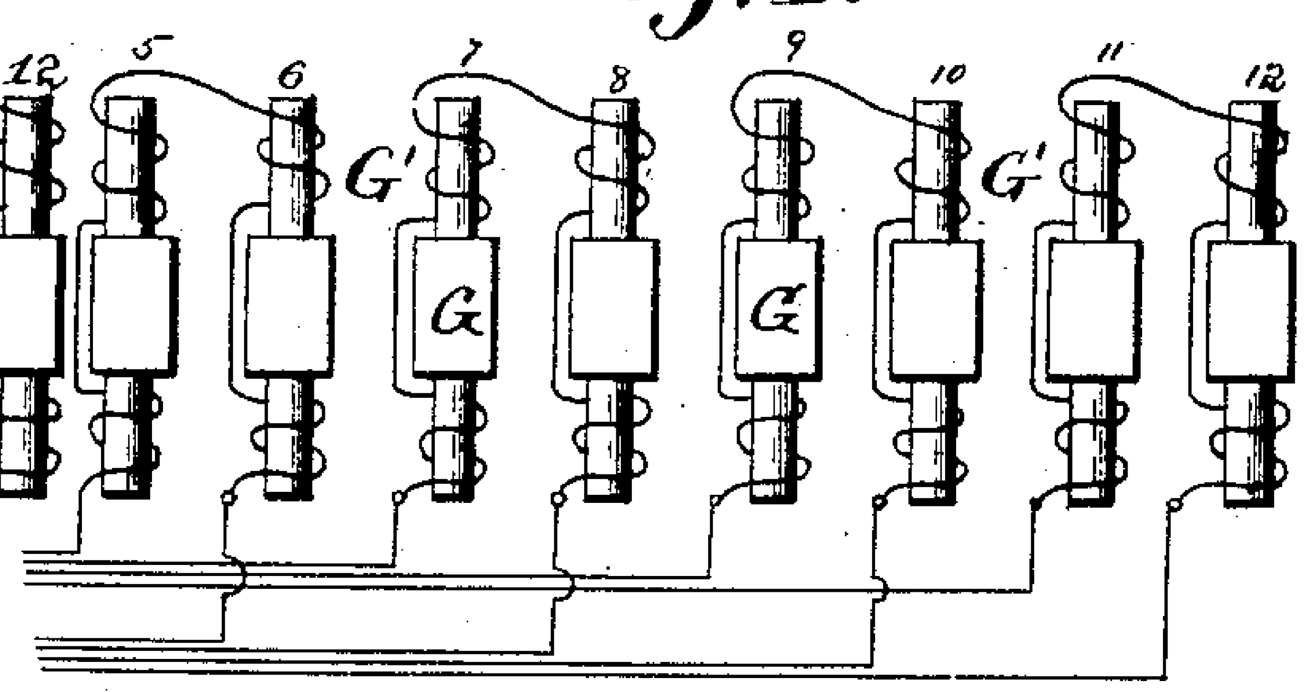


Fig. 10



Witnesses:
J. B. McGirr.
W. J. Drukar

Inventor:
William P. Wiemann
By his Attorneys,
Redding Bros.

UNITED STATES PATENT OFFICE.

WILLIAM P. WIEMANN, OF ALLEGHENY, PENNSYLVANIA.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 465,104, dated December 15, 1891.

Application filed December 30, 1890. Serial No. 376,244. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. WIEMANN, a citizen of the United States, and a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in dynamo-electric machines; and it consists of the peculiar construction and arrangement of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view taken through the machine in the direction of the armature-shaft. Fig. 2 is a vertical transverse sectional view on the plane indicated by the line *x x* of Fig. 1. Figs. 3 and 4 are detail views of one armature-core and its attached pole-piece in longitudinal elevation and transverse section, respectively. Fig. 5 is a detail perspective view, partly in section, of one of the end plates, the casing or shell, and a portion of one of the armature-cores and one of the bearings for the field-magnet shaft. Figs. 6 and 7 are detail side and end views, respectively, of the armature and its shaft. Fig. 8 is a diagram illustrating the manner of winding the field-magnet cores. Figs. 9 and 10 are diagrams showing the manner of winding the armature-cores and connecting the coils for an alternating-current dynamo.

Like letters and figures of reference denote corresponding parts in all the figures of the drawings, referring to which—

A designates the magnetizable iron mass, of soft iron, which is of suitable proportions, preferably narrow, as shown, and provided with the radial polar projections 1 2 3 4. The magnetizable iron mass is fitted on a horizontal shaft B, to which it is fixed by a clamping-screw *b* or other suitable contrivance, and this shaft is extended through the hollow cores C C, the end plates D D of the machine, and the bearings *e e*, arranged exteriorly on the end plates and in line with the hollow cores, as shown in Fig. 1.

The end plates D D are preferably in the form of disks, as shown, and provided with flanges *d d*, which are bolted or otherwise suitably secured to the base F of the machine, which base is made of non-magnetic or insulating material. At the edges of the disk-like end plates is the armature, the cores of which are provided with the pole-pieces G, arranged in series 5, 6, 7, 8, 9, 10, 11, and 12, or twice the number of polar projections 1 2 3 4 of the magnetizable iron mass A. Around the machine is the case or shield H′, preferably made of soft iron, which case incloses the operative parts of the machine and excludes dust and dirt therefrom.

The field-magnet cores C C are rigid with the end plates, (being made integral with said plates or suitably fixed thereto,) and these cores extend inwardly from the plates toward each other; but they are separated a suitable distance equal to or slightly greater than the thickness of the magnetizable iron mass A, which is arranged between said cores and in close juxtaposition to the same, but without actual contact therewith, to insure the best magnetic action between the parts.

The bearings *e e* are arranged or secured on the outside of the end plates for the proper support of the armature-shaft, which passes through the hollow field-magnet cores C C without coming into electrical contact therewith.

The end plates or disks D D are each perforated with a series of holes *g*, arranged near the edges of the plates or disks, and through these holes are passed bundles of soft-iron wires *g′*, which form the cores of the armature. These soft-iron wires pass entirely across the the machine from one end plate to the other plate, and the series of pole-pieces G are concentric with a circle described from the shaft B as an axis, so that the magnetizable iron mass can rotate freely within the circle of pole-pieces and cut through the magnetic field or lines of force of field-magnets in order to induce electric impulses in alternate directions, successively, in the field-magnets which constitute branches of the external or working circuit.

I provide a soft-iron pole-piece G for each core of the armature, which series of pole-pieces are arranged in the vertical plane of the magnetizable iron mass A and around the same. Each pole-piece has an opening h, through which is passed the bundle of soft-iron wires forming the core, and the inner face of the pole-piece, or that side thereof which faces the iron mass A, is concaved, so that the concave faces of the whole series of pole-pieces form segments of a circle within which the polar projections of the armature can rotate freely without actual contact, and yet move sufficiently close to secure good magnetic induction. I also propose to brace the bundle of soft-iron wires forming the cores to obviate the liability of deflection of said cores owing to the magnetic attraction between the armature and the magnetizable iron mass, and with this end in view a brace I, of non-magnetic material, is provided for each of the bundles of soft-iron wires. The brace is arranged outside of and parallel to the bundles of wires, and the ends of said brace are fastened to the end plates D D, while a bolt i passes through the brace and into the pole-piece to hold the bundle of wires rigid. The soft-iron shell or shield is arranged outside of the series of braces to wholly inclose the operating parts of the machine, and at suitable points in this shell or casing I provide openings, through which are led the wires for conducting the currents to the working external circuit.

C′ C′ are the coils of the field-magnet cores C C, and G′ G′ are the coils around the cores of the armature.

The coils or wires C′ C′ can be energized from a suitable generator, and said coils C′ C′ are wound around the field-magnet cores C C in the manner shown in Fig. 8—that is to say, the wire is coiled in one direction around one of the cores on one side of the magnetizable iron mass, while the same wire is coiled in the reverse direction around the other core on the opposite side of the magnetizable iron mass, said helices or coils C′ C′ being separated to provide a space for the magnetizable iron mass A, which would be a consequent pole if a direct current is passed through the coils, as the two coils are wound in reverse directions.

The armature has its cores wound in the same manner as the field-magnet cores just described, and thus the coil of the armature-core on one side of the pole-piece is wound in one direction and the coil on the opposite side of the pole-piece is wound in the reverse direction.

In Fig. 9 of the drawings I have illustrated one manner of connecting the armature-cores in series for alternating current, this view being a diagram in which the cores are numbered from 5 to 12, inclusive. One end of the coil of the first core 5 is used for one terminal and the other end of the coil is connected to the corresponding end of the adjacent or second coil 6, the cores being connected in pairs at one end of the coils thereof and the same terminals of the coils being connected to the corresponding ends of coils of adjacent pairs of cores, and so on. By passing a direct current through the field-magnet coils an alternating current is generated in the following way: The magnetizable iron mass being a consequent north pole and the field-pieces being consequent south poles, (which is due to the direct current passing through the field-coils,) the polar extensions 1 2 3 4, passing under the field-pieces 5, 7, 9, and 11, operate to short-circuit the lines of force when directly in line with the same and to break the circuit through said field-pieces when the alignment is destroyed. By this action there is more or less potential difference in the armature-cores, and thus a current is generated in one direction, and while this is in progress the current through the armature-cores 6, 8, 10, and 12 changes the poles to a consequent north pole, which are thus of the same polarity as the magnetizable iron mass. As the polar projections on the magnetizable iron mass are brought into line with the pole-pieces 6, 8, 10, and 12 a current is induced in said armature-coils, which flows in the reverse direction from the currents previously generated in the coils 5, 7, 9, and 11 in the manner hereinbefore described and shown. It will thus be understood that when the polar projections of the magnetizable iron mass are in line with a corresponding number of pole-pieces a maximum number of lines of force will pass through the coils covered by them and a minimum number through the coils not so covered. As the magnetizable iron mass turns so as to cover the next set, lines of force will be created in the set of coils so covered and destroyed in those which were covered before. There will thus be produced within each coil alternate maximum and minimum intensities of magnetic force, which will induce in the electric circuit an electro-motive force and corresponding current in alternate directions, successively.

In the diagram Fig. 10 is shown the manner of connecting parallel armature-coils for alternating current, in which the ends of the cores are provided with reversely-extending coils, the one end of the alternate coils 5, 7, 9, and 11 being connected to form one terminal, the same end of the other set of armature-coils 6, 8, 10, and 12 being connected and forming the other terminal, while the opposite ends of the coils are coupled in pairs. The action of the current with this arrangement of armature-coils is similar to that before described, except that all of the current does not pass through each coil, but only a portion of the current is induced in each individual coil and the currents from the several coils are united or combined at the terminals.

From the foregoing it is evident that there is but one break of the magnetic poles, which occurs between the radial polar projections of the magnetizable iron mass and the pole-pieces, and that if the dynamo is excited by passing a direct current from a suitable source of electric energy through the field-magnet coils the magnetizable iron mass A will be of one consequent polarity and the pole-pieces of the opposite polarity. As the magnetizable iron mass revolves a current will be induced in the armature-coils, as explained, and by shunting a current through the idle coils a greater potential difference is secured in the armature-coils, (which are branches of the external circuit and from which armature-coils the currents are taken,) and consequently a greater current will be generated for a given-size machine.

The number of armature-coils may be increased or decreased, as desired, the relative proportion of such cores and coils to the polar extensions of the magnetizable iron mass being always the same. It will also be seen that the magnetizable iron mass is the only moving part of the machine, as both the field-magnets and armature-coils remain stationary, which enables me to arrange the pole-pieces and the field-magnet coils very close to the moving mass without liability of injury to the parts.

It is to be observed that all the parts of this machine, except the windings, bearings for the shaft, the braces I, and the base, are made of iron.

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

1. In a dynamo-electric machine, the combination of the iron end plates having the rigid field-magnet cores, the shaft passing through said cores and carrying the magnetizable iron mass, the exciting-coils wound on the field-magnet cores, the armature having the cores formed by bundles of soft iron, which are secured to the end plates, the pole-pieces fixed to the cores in the plane of the iron mass, the braces rigid with the end plates and with the armature-cores or pole-pieces, and the casing, substantially as described.

2. A dynamo-electric machine comprising the metallic end plates carrying the rigid field-magnet cores, the magnetizable iron mass carried by a shaft which extends through said field-cores, the exciting-coils wound on the field-magnet cores, the armature having its cores provided with pole-pieces, which form multiples of the polar projections on the iron mass, and braces for the cores of the armature, substantially as described.

3. A dynamo-electric machine comprising the end plates having the rigid hollow field-magnet cores, a shaft passing through said cores and journaled in exterior bearings, the magnetizable iron mass on the shaft, the exciting-coils wound reversely on the field-magnet cores, the armature having its cores formed of bundles of soft iron and provided with reverse coils on opposite sides of the central pole-pieces, and rigid braces for the soft-iron cores, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WM. P. WIEMANN.

Witnesses:
FRED WALDSCHMIDT,
JOHN C. WIEMANN.