(No Model.) 3 Sheets—Sheet 1.

W. P. FREEMAN.

DYNAMO ELECTRIC MACHINE.

No. 270,780. Patented Jan. 16, 1883.

FIG. 1.

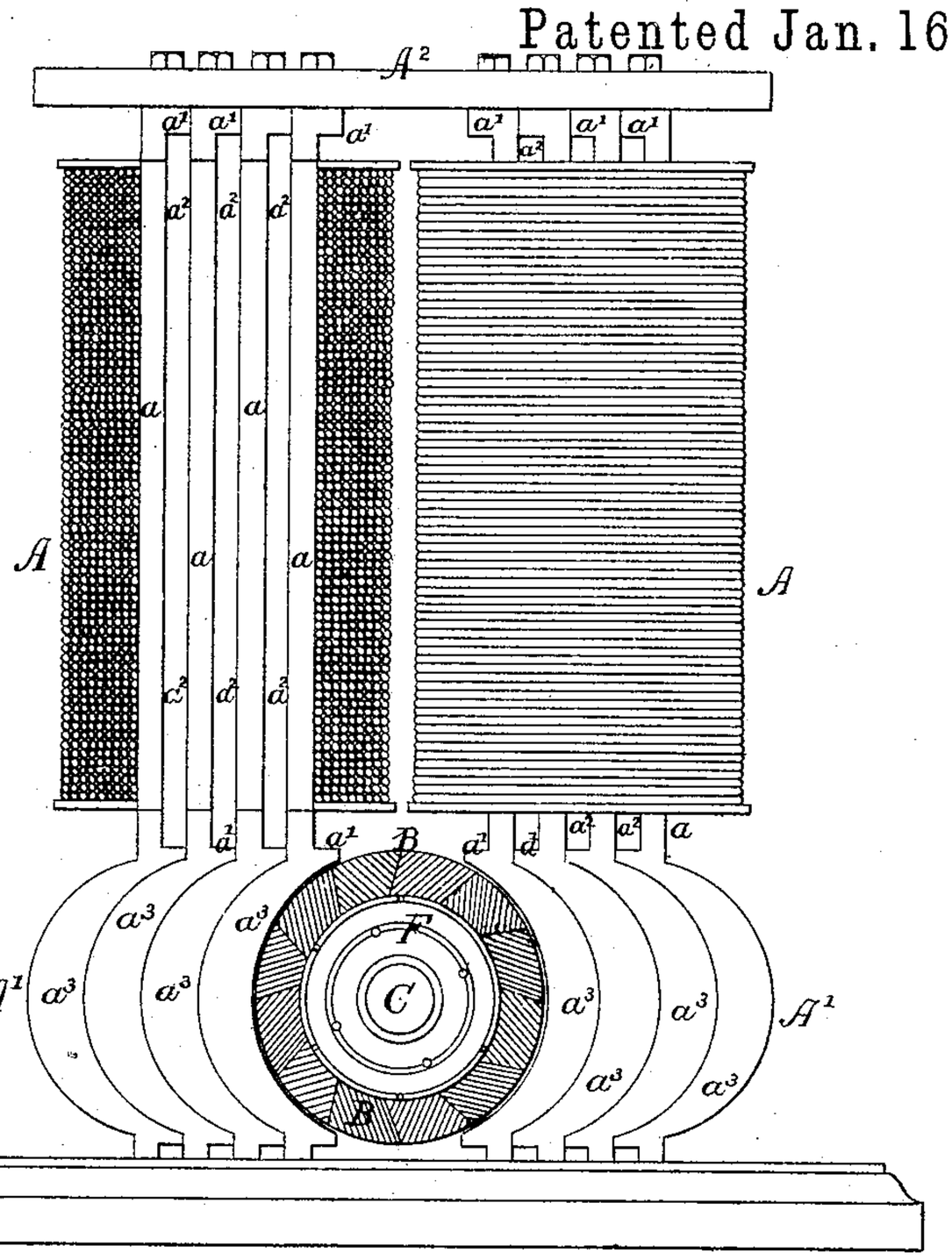
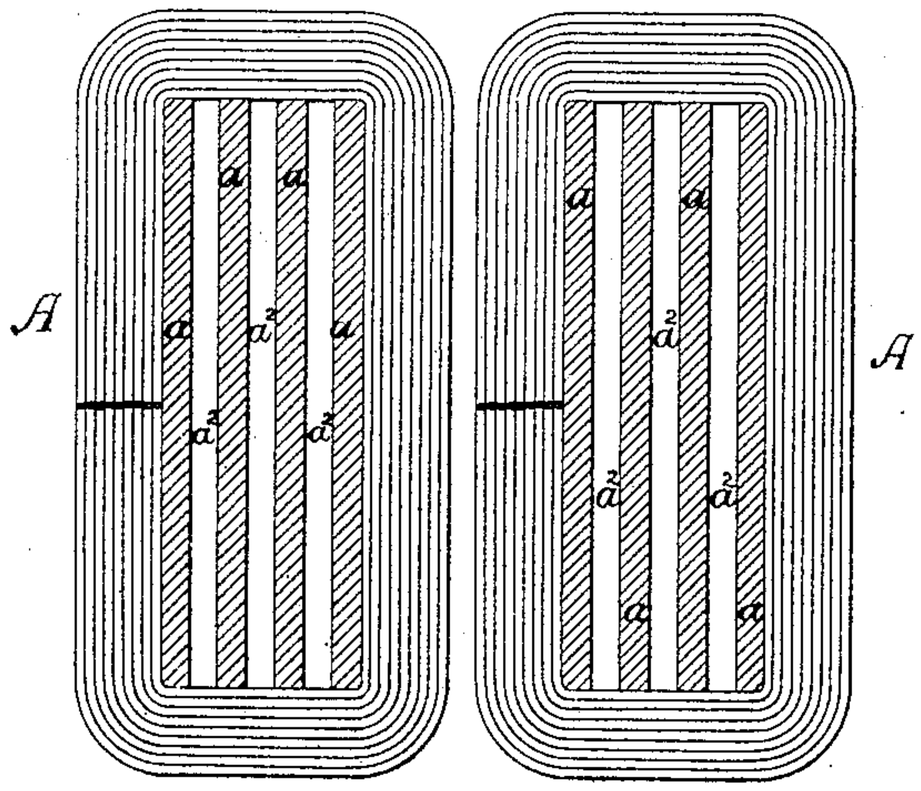


FIG. 2.



WITNESSES:

Harry Drury

James J. Tobin

INVENTOR:

Warren P. Freeman

by his Attys.

Howson and Sons

(No Model.) 3 Sheets—Sheet 2.

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FIG. 3.

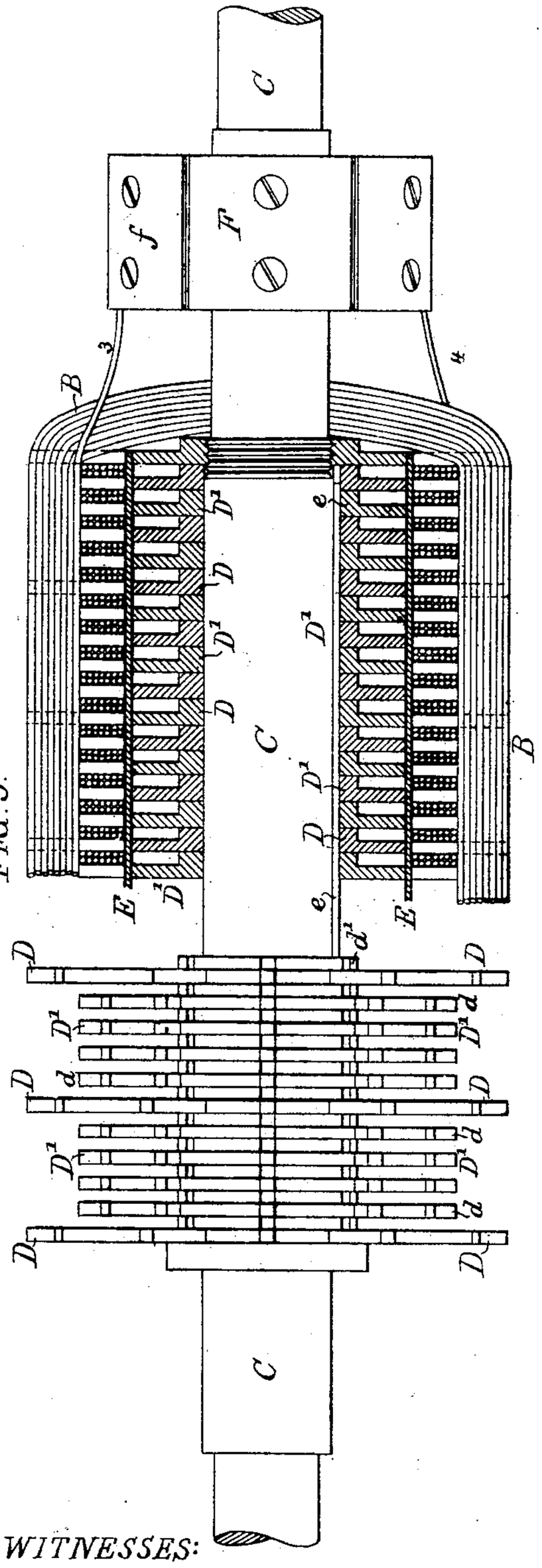


FIG. 5.

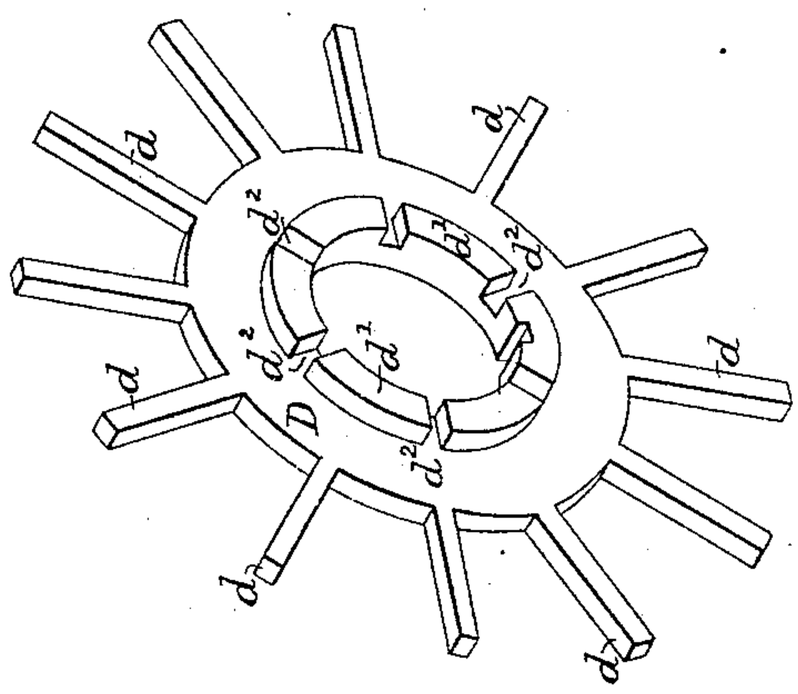
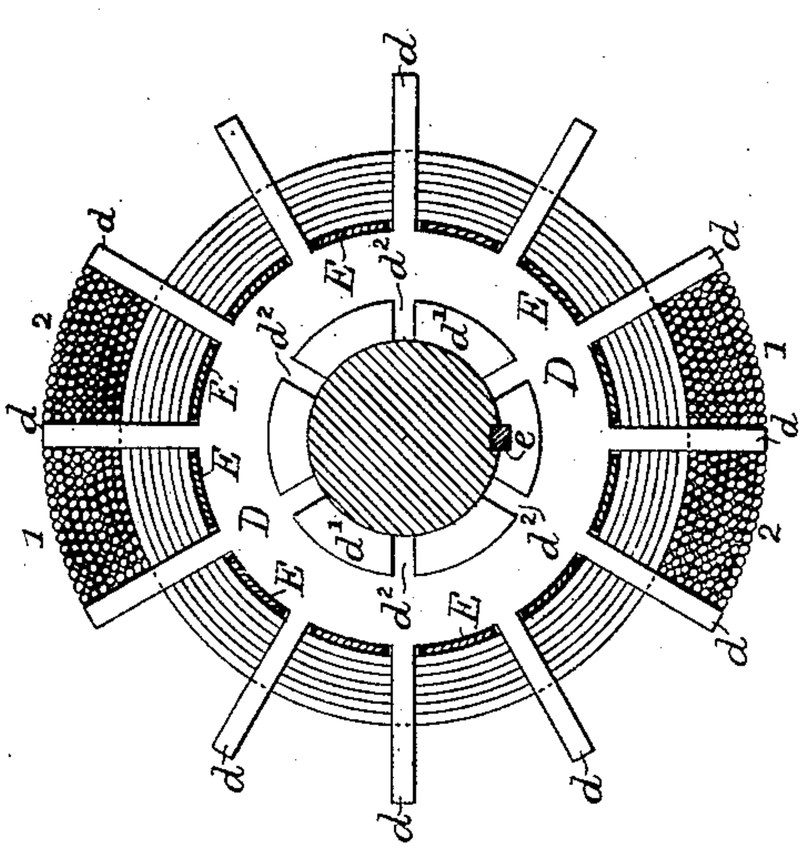


FIG. 4.



WITNESSES:

Harry Drury
James F. Tobin

INVENTOR:

Warren P. Freeman
by his Attys
Howson and Sons

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FIG. 6

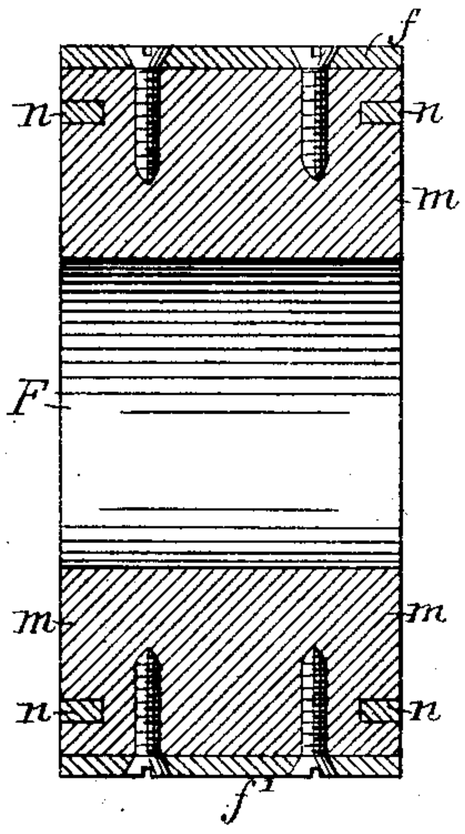


FIG. 7.

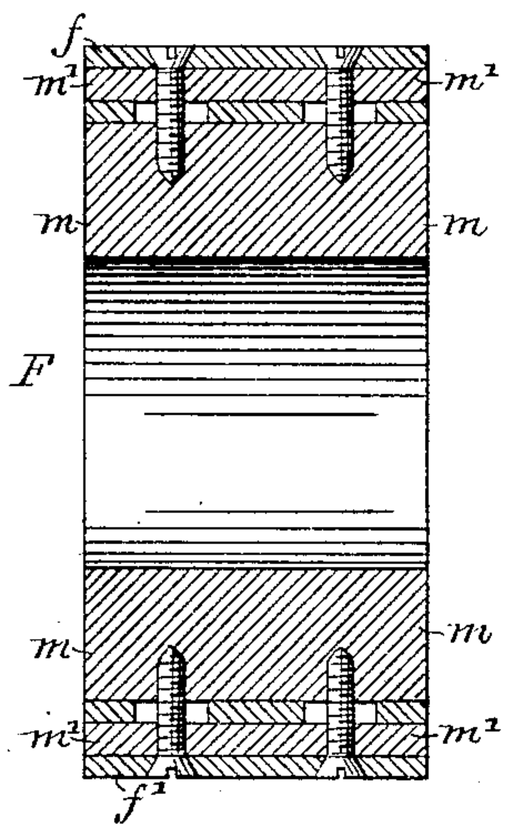
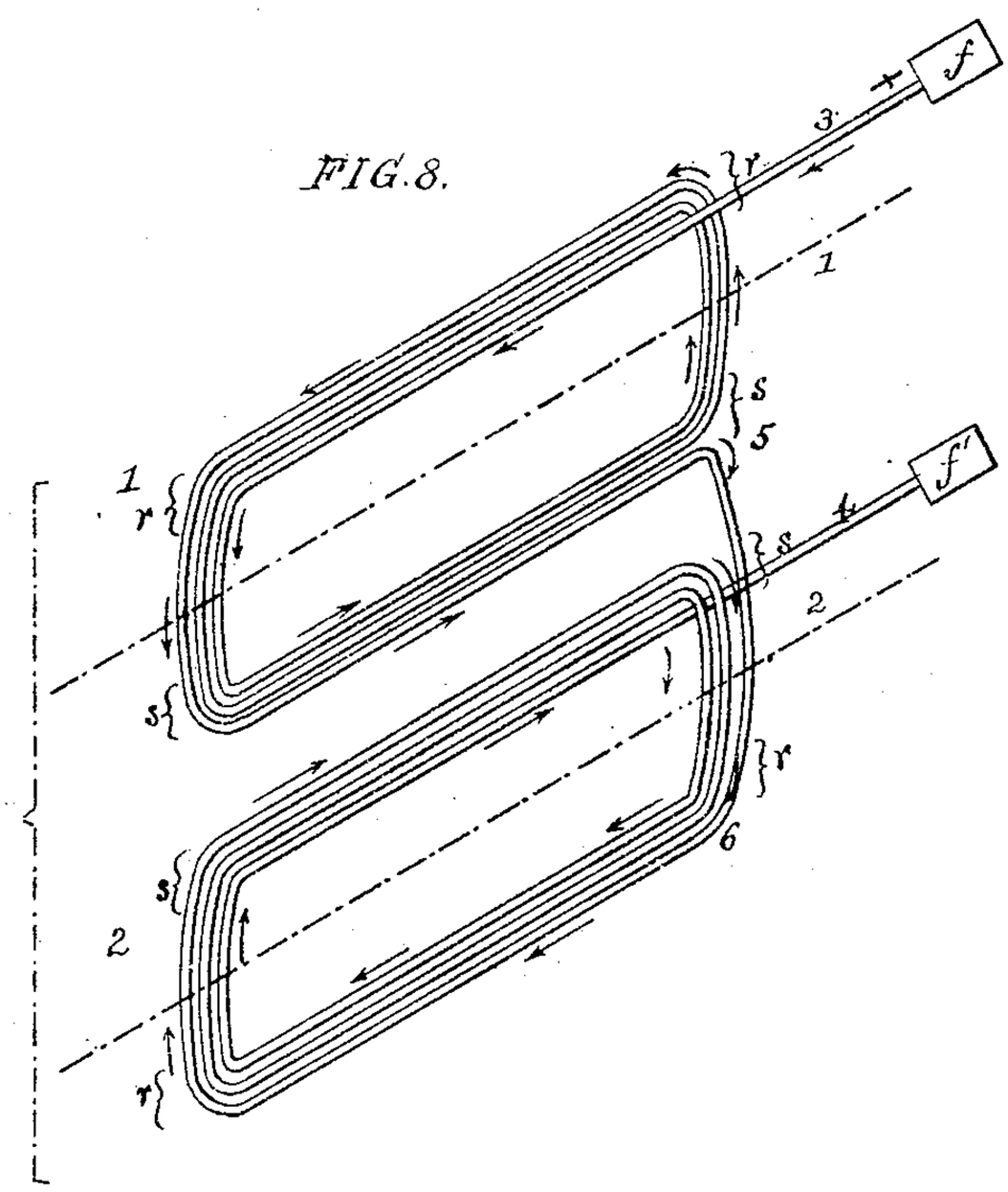


FIG. 8.



WITNESSES:

Harry Drury

James F John

INVENTOR:

Warren P. Freeman

by his Attys

Howson and Sons

UNITED STATES PATENT OFFICE.

WARREN P. FREEMAN, OF NEW YORK, N. Y., ASSIGNOR TO WILLIAM F. JOBBINS, OF EAST ORANGE, NEW JERSEY.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 270,780, dated January 16, 1883.

Application filed July 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, WARREN P. FREEMAN, a citizen of the United States, and a resident of New York city, State of New York, have invented certain Improvements in Dynamo-Electric Machines, of which the following is a specification.

My invention consists of certain improvements in the construction of dynamo-electric machines, as more fully described hereinafter.

In the accompanying drawings, Figure 1 is a vertical side view of the machine with the commutator-brushes and bearing for the armature removed and one of the field-magnets in section; Fig. 2, a sectional plan of the field-magnets; Fig. 3, a view of the armature, showing one end in section wrapped, and at the other end an outside view of the body before it is wrapped; Fig. 4, a transverse section of the armature; Fig. 5, a perspective view of one of the disks composing the body of the armature; Fig. 6, a section of the commutator-wheel; Fig. 7, a section of a modified form of commutator-wheel, and Fig. 8 perspective diagrams illustrating the manner of winding the armature.

My dynamo-electric machine is of that class in which the field-magnets A A have enlarged poles A′ A′ embracing a cylindrical armature, B, adapted to revolve between the two poles, the magnets being connected at their outer ends by the usual strap, A^2.

My present invention, in so far as it relates to the construction of field-magnets, consists in making the cores and the curved poles of a number of plates, *a a*, parallel with the axis of the armature, one side of the straight portion of each plate or section being provided with offsets *a′*, so that when the sections are fitted together spaces a^2 will be left between the adjoining sections, Figs. 1 and 2, while the curved portions a^3, forming the poles A′, fit closely one into the other. The intervening spaces between the straight portions of the sections extend beyond each end of the wrapping, so as to allow a free circulation of air through the cores.

The armature B is mounted on a shaft, C, and its body is composed of a series of disks, D and D′, of brass, with radiating arms *d*, Figs. 4 and 5, the arms *d* of the disks D′ being about half the length of those of the disks D. Each disk has on one side a boss or hub, *d′*, so that when the disks are fitted together on the shaft the outer portions of the disks will be spaced, as shown in Fig. 3, and in each hub *d′* are formed radial notches d^2 for air-spaces, Figs. 4 and 5. These disks may be secured on the shaft by forming a screw-thread on the shaft and screwing each disk upon it, or by providing the shaft with a collar at one end and a feather, *e*, over which the disks are fitted, Fig. 3, the last disk being screwed onto the shaft to secure the whole together. The disks D and D′ may be secured on the shaft alternately; but in the drawings I have shown four disks D′ intervening between disks D. These disks having thus been secured together, with their radial spokes in line, insulated iron slats or strips E are placed in the longitudinal grooves formed by the intervening notches and parallel with the axis C, Figs. 3 and 4. The spaces between the adjoining disks are then wound circumferentially with coils of iron wire over the slats E to the height of the radial arms of the disks D′, the coils in each space being unconnected with the next, but magnetically insulated therefrom by the brass arms, the object of using separate coils being to allow of the more rapid magnetization and demagnetization of these iron coils, which form the magnetic core of the armature. On the core thus formed are wound longitudinally the insulated inducing-coils, whose terminals are connected to the commutator F. The projecting radial arms of the disks D, Fig. 4, form guides for the several coils, and in the drawings I have represented the armature as having twelve spaces for the coils and therefore six coils, the commutator being provided with six insulated commutator-plates, to which the terminals are connected.

The pins *d*, which serve as guides and extend to the surface of the armature, being of non-magnetic metal, do not retard the revolution of the armature, as would be the case were there any protruding magnetic poles.

The coils are wound in pairs 1 and 2, Fig.

4, with the two terminals 3 4 for the two pairs, and the manner of winding these coils is illustrated in the diagram Fig. 8, in which the two coils 1 and 2, forming a pair, are represented separately, although in the armature they lie side by side, with the portion *r* of one coil adjacent to the portion *r* of the other coil, and similarly the portions *s s* of the two coils adjacent to each other. The two opposite commutator-plates on which the brushes bear when these coils are in circuit are represented by *f f'*, and supposing the current to enter at *f* it passes first through the terminal 3 to the inside of the coil 1 in the direction of the arrows, and leaves this coil 1 on the outside at 5, and passes across to the outside of the adjoining coil 2 at 6, and taking the course indicated by the arrows leaves the coil 2 at the inside and passes out through the terminal 4 to the plate *f'* of the commutator.

The main body *m* of the commutator F, I prefer to make of wood or similar material, to be secured to the shaft, and to strengthen this and prevent it from splitting I make use of a ring or rings, *n*, of metal. Where two such rings are used I set them in grooves on the opposite faces of the body of the commutator F, as shown in Fig. 6, but clear of the screws which retain the segments *f f'*. Where one ring is used, as shown in Fig. 7, it is fitted over the body *m* with openings of sufficient size to allow the retaining-screws for the plates *f f'* to clear it, and wood or similar insulating material, *m'*, is placed between the ring *n* and the segments *f f'*, as shown in Fig. 7.

Some of the features of my present invention are applicable to electric motors as well as to dynamo-electric machines.

I claim as my invention—

1. Field-magnets for dynamo-electric machines or electric motors having their cores and poles made of sectional plates parallel with the axis of the armature, and with air-spaces between the core portions of the plates.

2. A sectional plate for the core and pole of an electro-magnet, consisting of a straight portion, *a*, and curved end a^3, with offsets *a'*.

3. An armature having its body composed of a shaft and a series of non-magnetic disks, with radiating arms and bosses or hubs *d'*.

4. An armature having its body composed of a shaft and a series of non-magnetic disks, with radiating arms and hubs *d'*, with notches d^2.

5. The combination of a series of non-magnetic disks forming the body of an armature with a series of circumferential coils of iron wires separated from each other by said disks.

6. The combination of a series of disks forming the body of an armature with a series of circumferential coils of iron wire magnetically insulated from each other.

7. An armature-body composed of a shaft and a series of disks having hubs *d'* and radial arms *d*, the arms on some of the disks being of greater length than those on the intervening ones.

8. The combination of the shaft and disks having radial arms with slats E, circumferential coils forming the core, and outer inducing-coils.

9. An armature in which the insulated inducing-coils are combined with non-magnetic guide-pins on the armature-body extending to near the surface of the coils.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WARREN P. FREEMAN.

Witnesses:
FRANKLIN J. BISCHOFF,
HUBERT HOWSON.