

S. H. SHORT.  
FIELD MAGNET FOR ELECTRIC MACHINES.

(Application filed May 4, 1896.)

(No Model.)

Fig. 1.

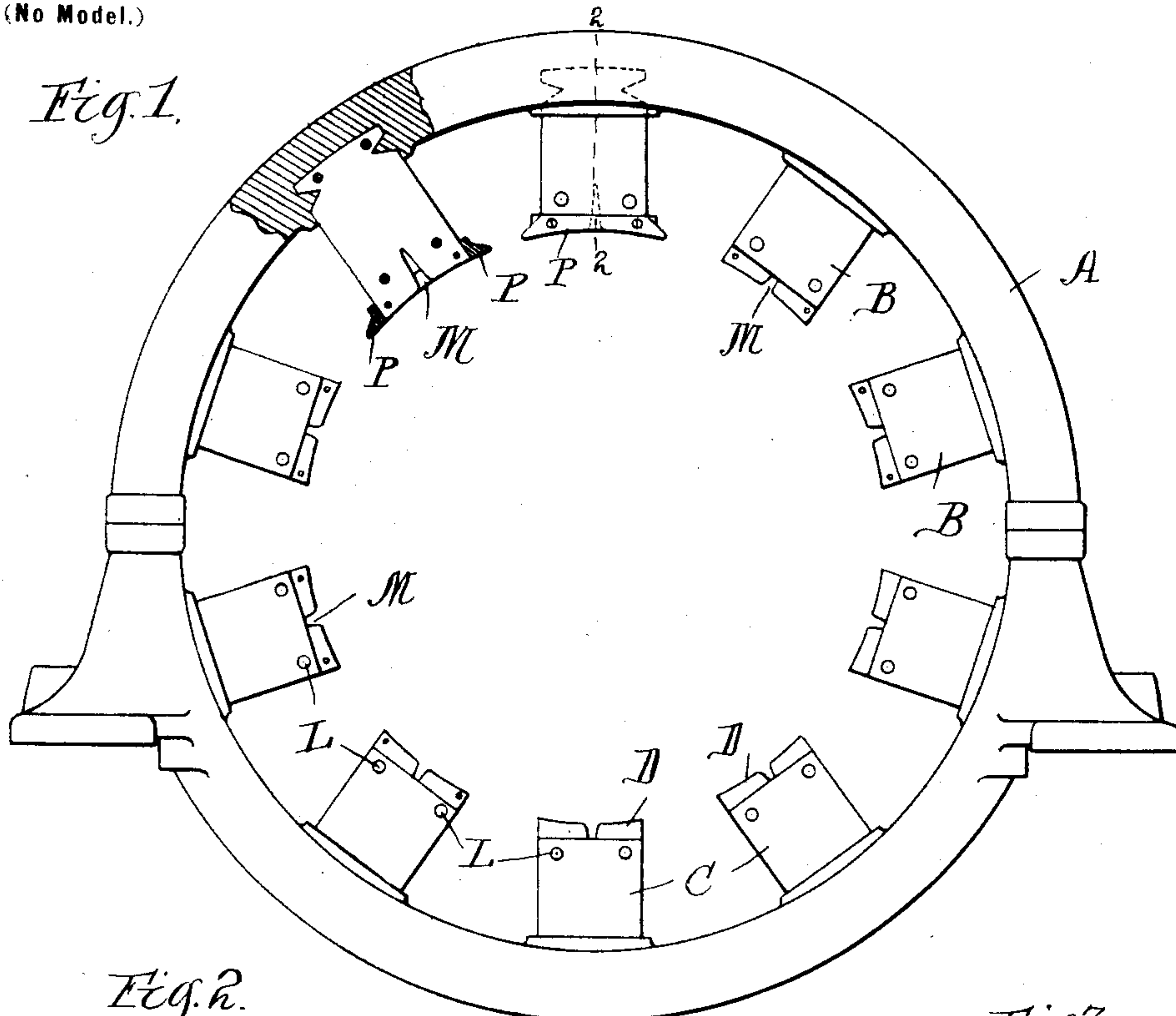


Fig. 2.

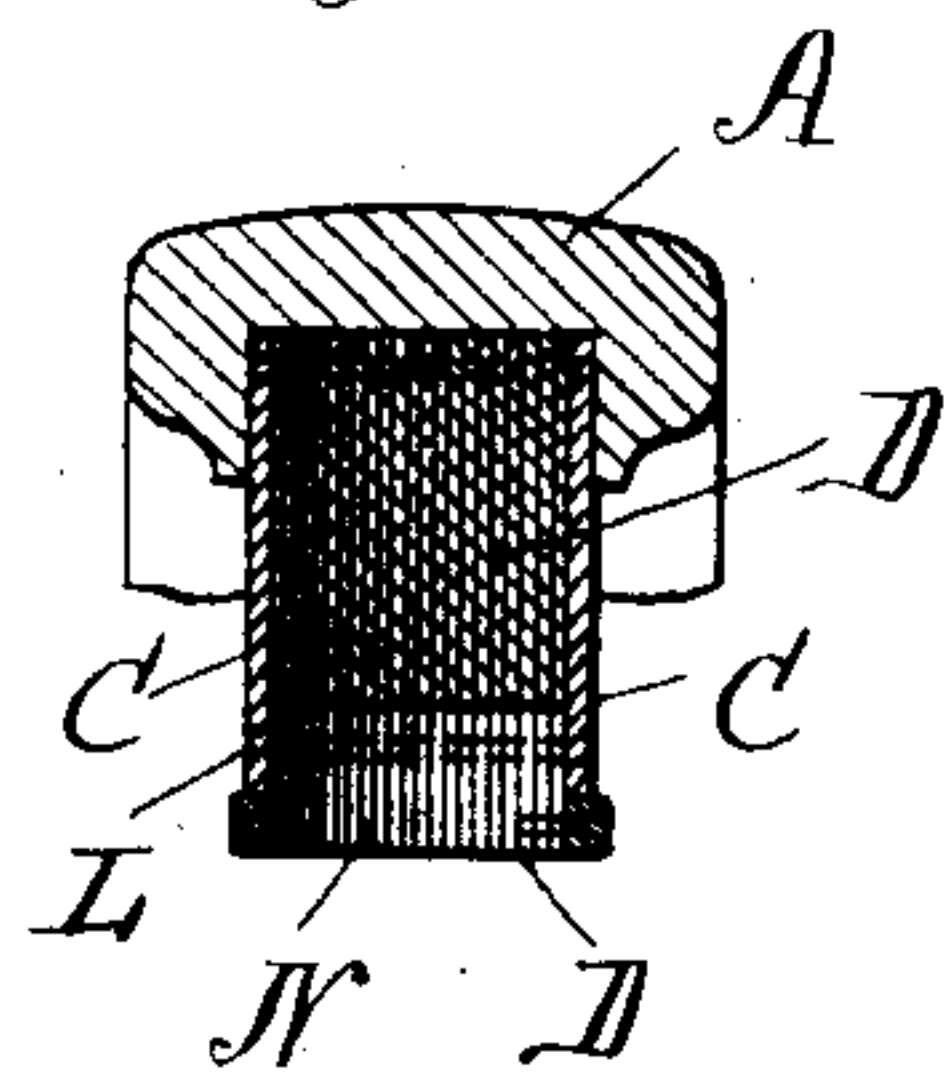


Fig. 4.

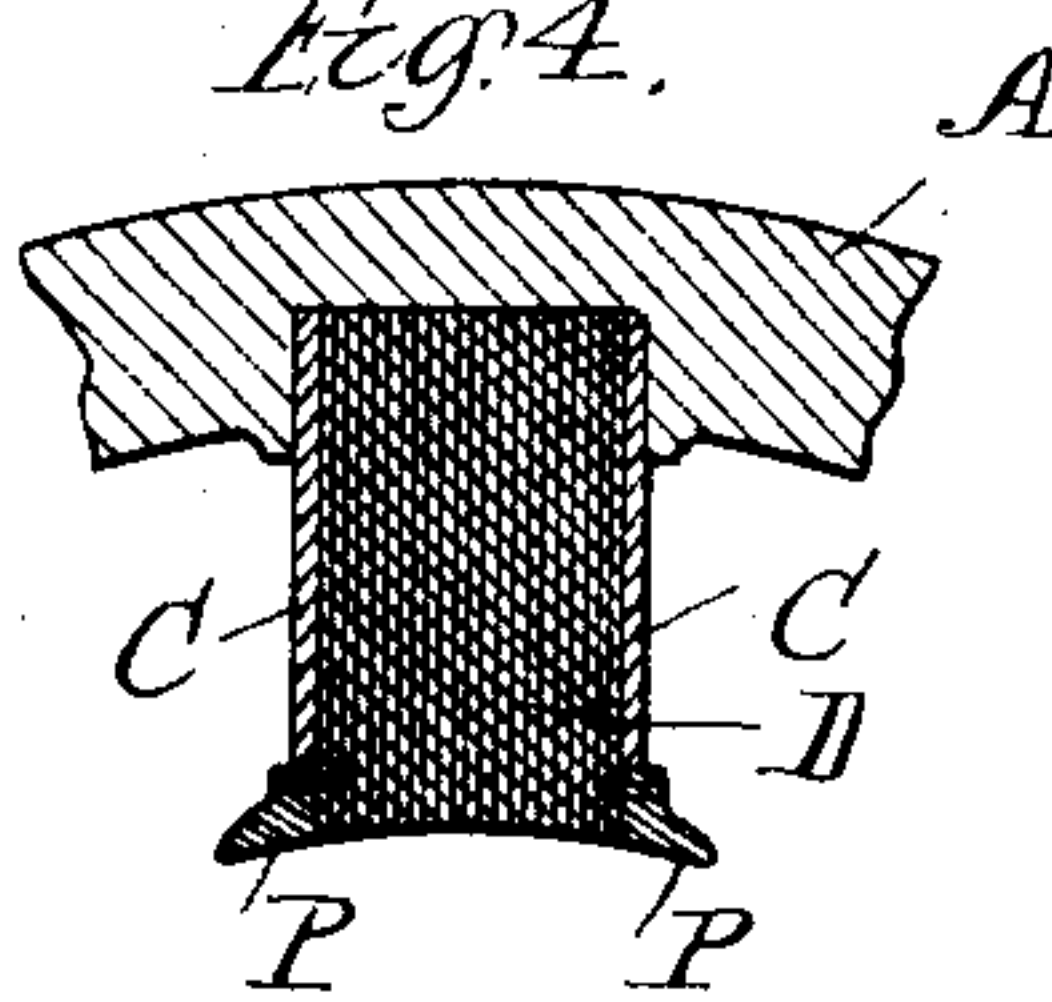


Fig. 3.

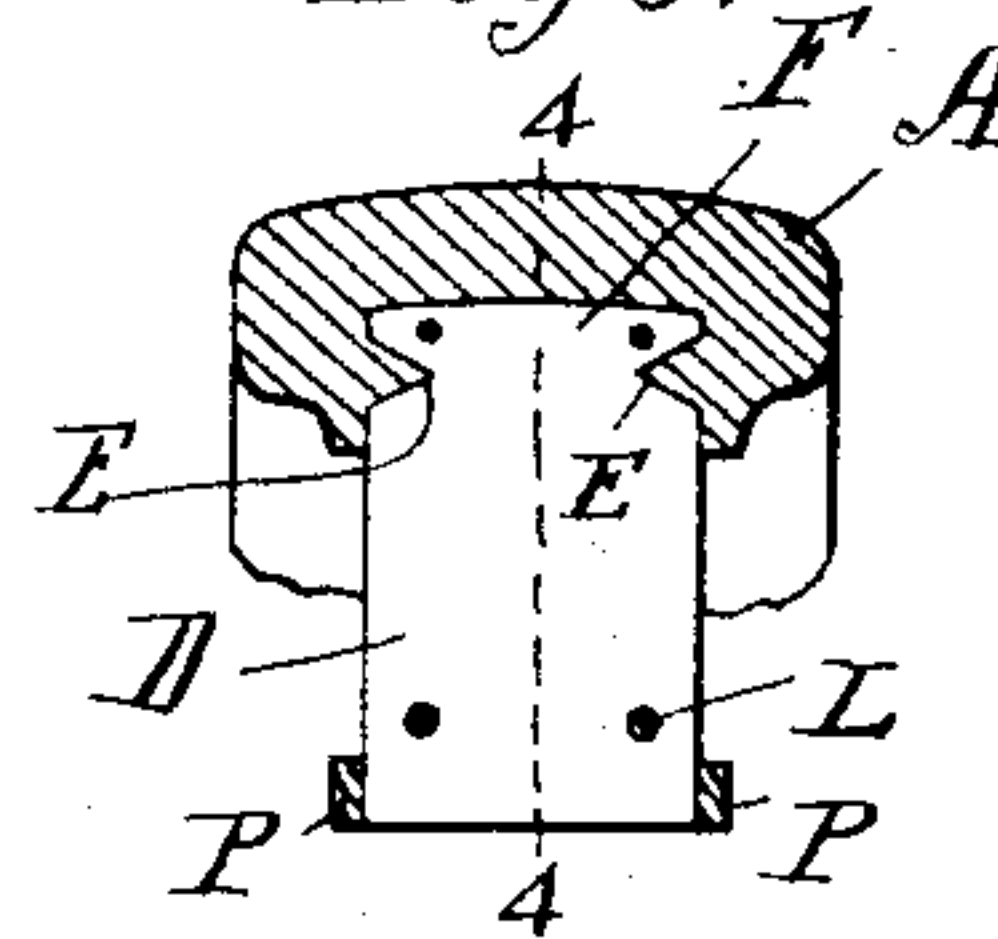
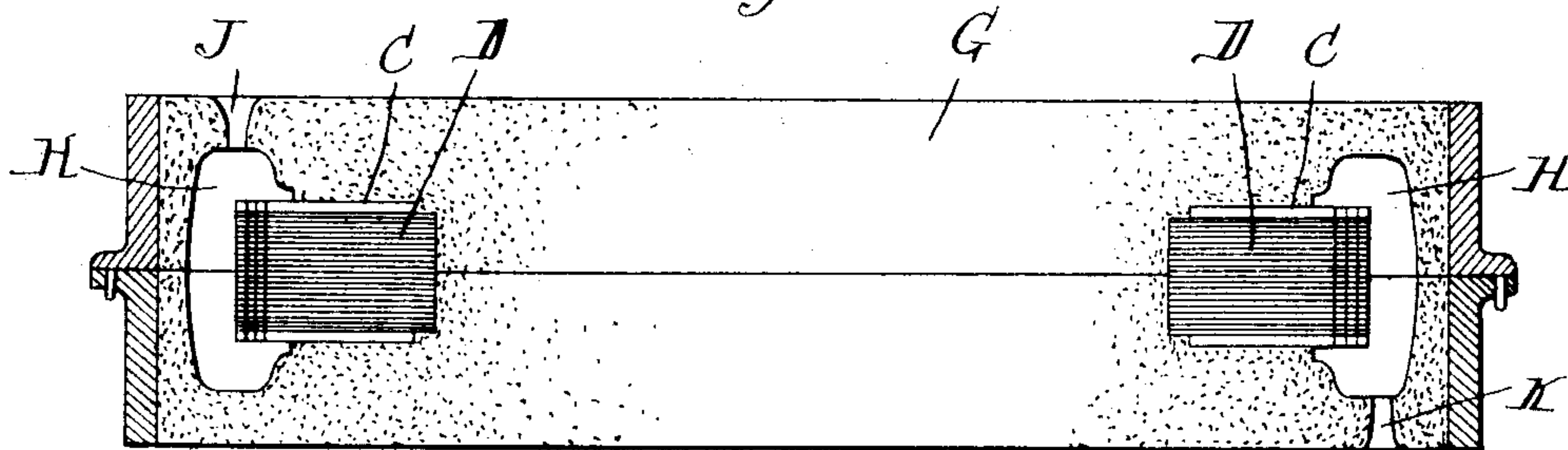


Fig. 5.



Witnesses.

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Wm. J. Huming

Inventor  
by Sidney H. Short  
Prosser & Co. Attys.



# UNITED STATES PATENT OFFICE.

SIDNEY H. SHORT, OF CLEVELAND, OHIO.

## FIELD-MAGNET FOR ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 607,609, dated July 19, 1898.

Application filed May 4, 1896. Serial No. 590,220. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY H. SHORT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Field-Magnet for Electric Machines, of which the following is a specification.

This invention relates to the manufacture of field-magnets for electric machines.

The object of the invention is to facilitate and cheapen the cost of the manufacture of field-magnets for electric machines.

A further object of the invention is to provide a construction of field-magnets wherein the greatest possible magnetic effect is obtained from the field-magnets.

A further object of the invention is to provide an exceedingly simple and efficient method of mounting the field-magnet bobbins in their supporting casting or frame.

Further objects of the invention will more fully hereinafter appear.

The invention consists, substantially, in the construction, combination, arrangement and location of parts, and mode of operation, as will be more fully hereinafter set forth, as shown in the accompanying drawings, and, finally, as specifically pointed out in the appended claims.

Referring to the accompanying drawings and to the several views and reference-signs appearing thereon, Figure 1 is a view in end elevation, parts being in transverse section, of field-magnets for an electric machine constructed in accordance with the principles of my invention. Fig. 2 is a transverse sectional view of the field-magnet and its support embodying my invention, taken upon the lines 2-2 of Fig. 1. Fig. 3 is a transverse sectional view of a field-magnet and its support embodying my invention, illustrating a slightly-modified form of arrangement of parts. Fig. 4 is a detailed sectional view of the construction shown in Fig. 3, taken on the lines 4-4. Fig. 5 is a view in central vertical section of a sand mold, illustrating a step in the process of carrying out my invention.

In the drawings reference-sign A designates what may be termed the "frame" or "rim," upon which are supported the field-magnets.

B designates the field-magnet cores. These cores preferably comprise a series of soft-iron plates or laminations placed flatwise upon

each other and suitably secured together between the end plates C. The series of plates D, forming the magnet-cores, are spaced at equal distance apart peripherally upon the inside of the supporting frame or casting A, as shown, with their ends presented radially toward the common center and suitably curved in the arc of rotation of the periphery of the armature.

I will now describe the construction, arrangement, and mode of operation whereby the magnet-cores are mounted and securely held in place in the casting or supporting-rim A.

Each plate D, and also the side plates C, is stamped out of a sheet of suitable material, and at one end thereof is provided with stamped-out niches E in the edges thereof, leaving the end portions F of substantially a dovetailed appearance, as clearly shown in Fig. 3. The laminations are then built up with said niches E of all the plates comprising each lamination registering with each other. The several laminations are then carefully arranged in a sand mold G, with a suitable groove or channel formed around the projecting dovetailed ends of the plates F, as clearly shown in Fig. 5, the several cores being spaced accurately and carefully with reference to a given center to occupy the same position they will occupy upon the frame or rim A when completed. The channel H is arranged to extend circularly around the entire mold and to include in its circuit only the projecting end portions of the several laminations, and in cross-section said channel H is the same shape that it is desired to impart to the finished rim A. A suitable opening J is formed in one side of the sand mold in communication with said channel H, and a similar opening K is provided on the opposite side of said sand mold, also communicating with the channel H. Molten metal of suitable material to form the casting A is then poured into the channel H of the mold through the opening J and is allowed to flow freely around and through said channel H as a raceway and out through passage K a sufficient length of time to bring the projecting or dovetailed ends of the several cores to the welding heat or to practically the same heat as the heat of the molten metal. When that point is attained, the outflow through passage K is arrested and the chan-



nel H is filled up and permitted to cool. The projecting or dovetailed ends of the several bobbins are thereby firmly and irremovably welded into the metal forming the rim or magnet-core support. By this construction molten metal will fill the niches E in the plate forming the cores and also the niche in the holding-plates C, thereby forming an efficient means of attachment of the cores to the frame or rim A when the casting is complete.

It will be seen that the several plates or laminæ are placed face to face in order to form the magnet-core and that said plates are held together by means of side plates C and the bolts L, as shown.

In the operation of an electric machine it is a well-known fact that the rotation of the armature in close proximity to the projecting ends of the field-magnets exerts a pulling effect or stress upon the magnetism induced in the field-magnets in the direction in which the armature rotates—that is to say, during the rotation of the armature more lines of force are crowded into the side of the field-magnet from which the armature is moving than in the other side of such magnet. This is a defect which it is important to overcome for the reason that the best results are attainable when there is an even and equal distribution of the lines of force generated or induced in the field-magnets. I avoid the objection noted and secure a more nearly equal distribution of the induced lines of force in the field-magnets and prevent the pulling effect or stress which concentrates the lines of force in one side or portion of the field-magnets by providing in the end of each of the plates D a stamped-out kerf M, extending, preferably, centrally and longitudinally of said plate. If desired, two or more of such kerfs may be stamped out of each plate. In Fig. 2 said kerfs are indicated at N. It will be observed that these kerfs are provided in that end of the laminæ forming that part of the core which is presented toward the armature. By this construction I provide a break in the continuity of the end surface of the core, it being understood that in the form being described, embodying my invention, the plates or laminæ forming the cores are arranged with their flat surfaces in the plane of rotation of the armature. The break in the continuity of the ends of the cores prevents the concentration of the lines of force in one edge of the cores or magnets adjacent to the path of travel of the armature by presenting a gap.

In Figs. 3 and 4 I have shown a slightly-modified arrangement of the plates wherein the same results are obtained without kerfing the ends of the plates forming the field-magnet core or winding support. In the construction shown in these figures of the drawings, instead of arranging the flat sides of the plates forming the lamination in planes at right angles to the axis of rotation of the armature, I arrange the flat sides of said plates

in planes containing the axis or parallel with the axis. In such construction it is unnecessary to provide said plates with kerfs, for the reason that the joint between adjacent plates effects such breaks in the continuity of the surface of the end of the cores as will prevent the concentration of the lines of force in the one side thereof.

In the operation of electric machines of the class to which my invention relates it is important to utilize as nearly as possible all the lines of force created in the field-magnets in the operation of the machine, and in order to accomplish this result I mount over that end of the core B which is presented toward the armature a soft-iron casting or ring P and detachably secure or bolt the same in place, said casting or ring P serving not only to retain in position the field-magnet coil, but also to make more effective the lines of force, and said ring or casting P being suitably curved to form a continuation of the face curvature of the armature ends of the field-magnet cores or coil-supports.

Many alterations and changes in the details of construction, arrangement, and mode of operation would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited or restricted to the exact details of construction, arrangement, and mode of operation shown and described; but,

Having now set forth the object and end of my invention and a form of apparatus embodying the same and the method of operation, its function, and purpose, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent of the United States, is—

1. In an electric machine, a supporting-ring, a core or support for the field-magnets, radially mounted on said ring, said core comprising a series of plates or laminations, thereby forming breaks in the continuity of the end surface of such cores presented to the armature, in combination with a ring of magnetic material arranged upon the end thereof adjacent to the path of rotation of the armature and forming a continuation of the surface of such laminations; as and for the purpose set forth.

2. In an electric machine, cores or supports for the field-magnet windings, each comprising a series of plates or laminations, whereby the continuity of the end surface of such cores is broken, in combination with a ring of magnetic material arranged to surround the armature end of each of said cores or supports; as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 30th day of April, 1896, in the presence of two subscribing witnesses.

SIDNEY H. SHORT.

Witnesses:

R. N. BAYLIS,  
C. K. KING.