

(No Model.)

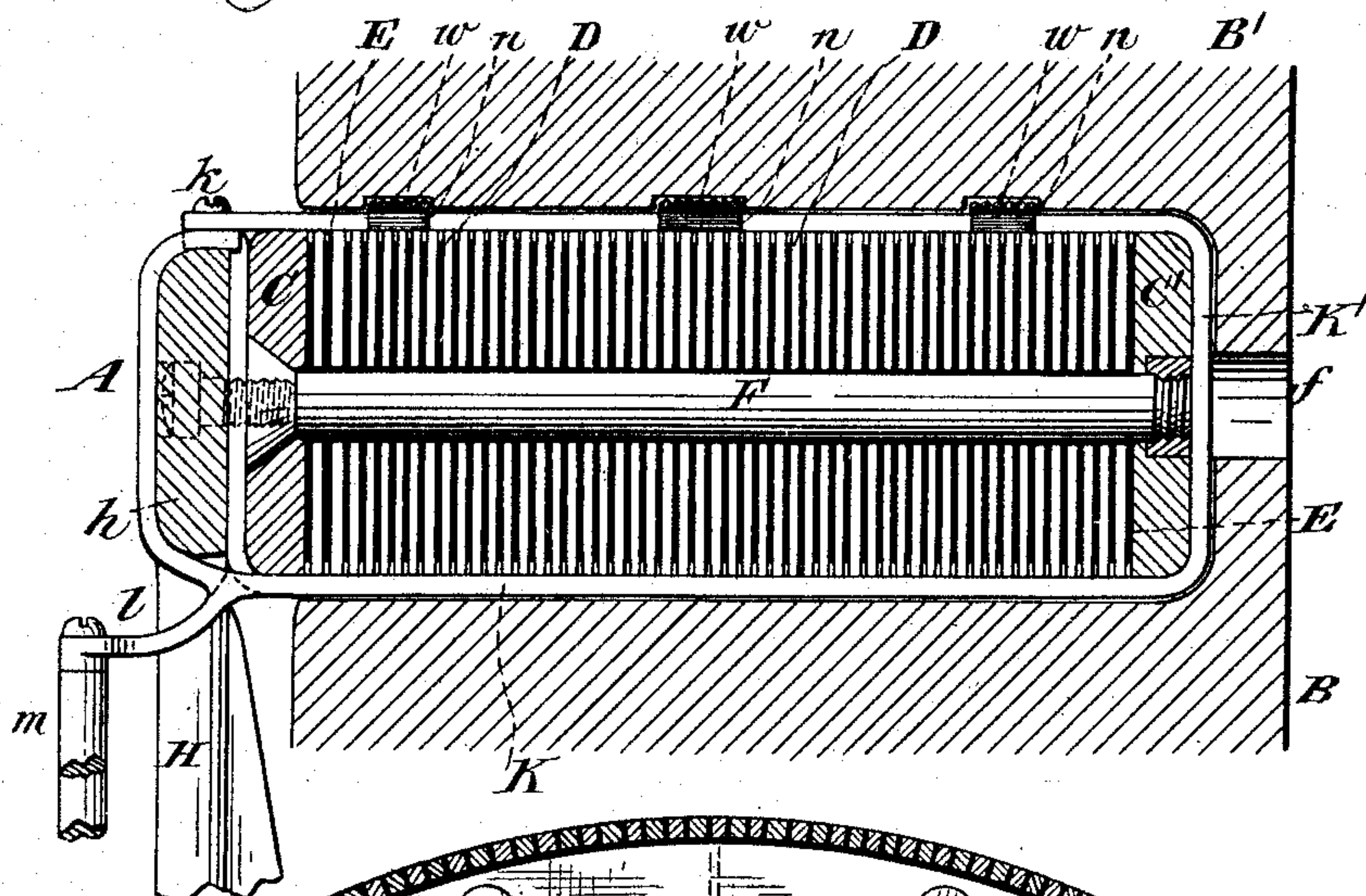
E. A. SPERRY.

ANNULAR ARMATURE FOR DYNAMO ELECTRIC MACHINES.

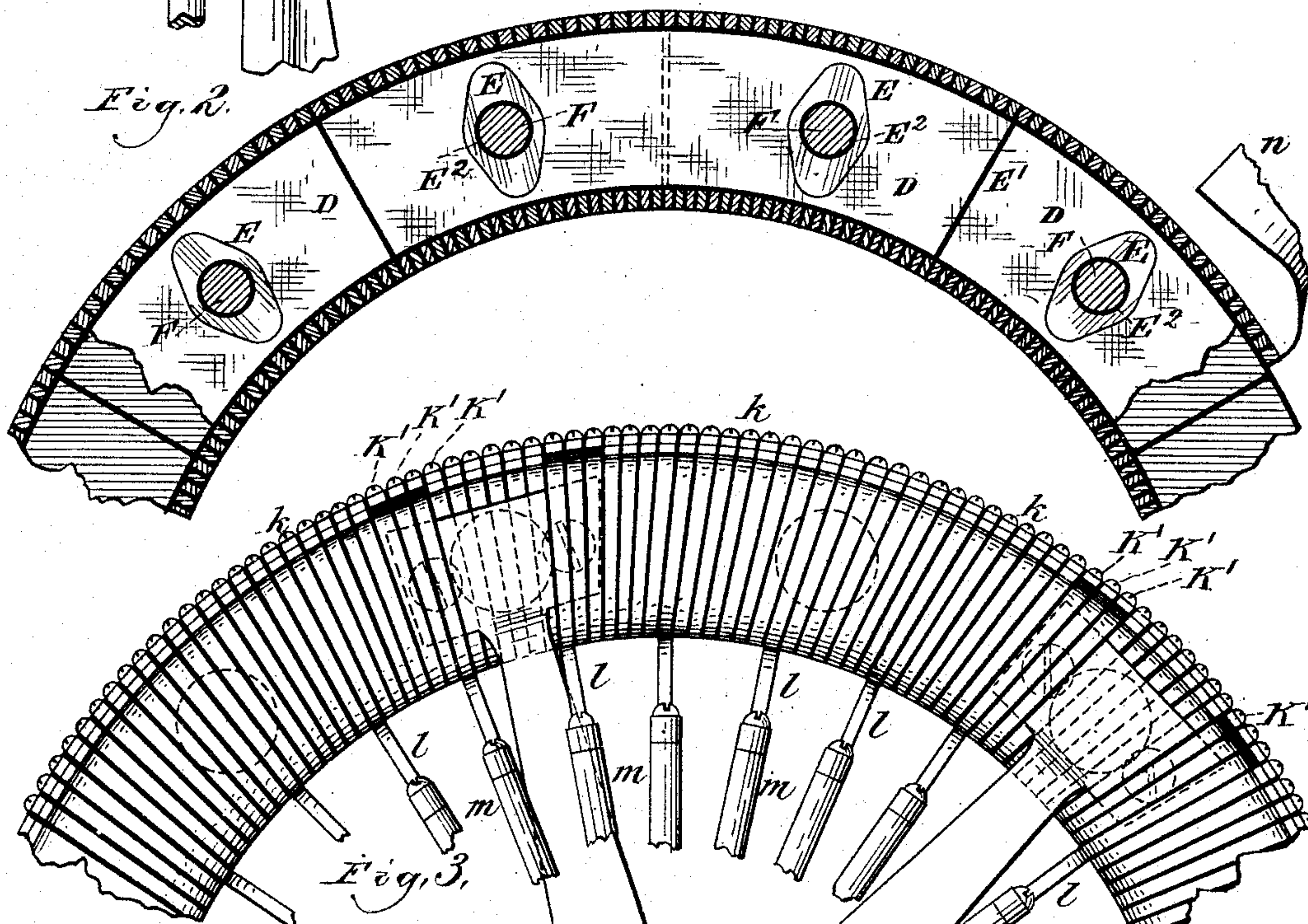
No. 353,989.

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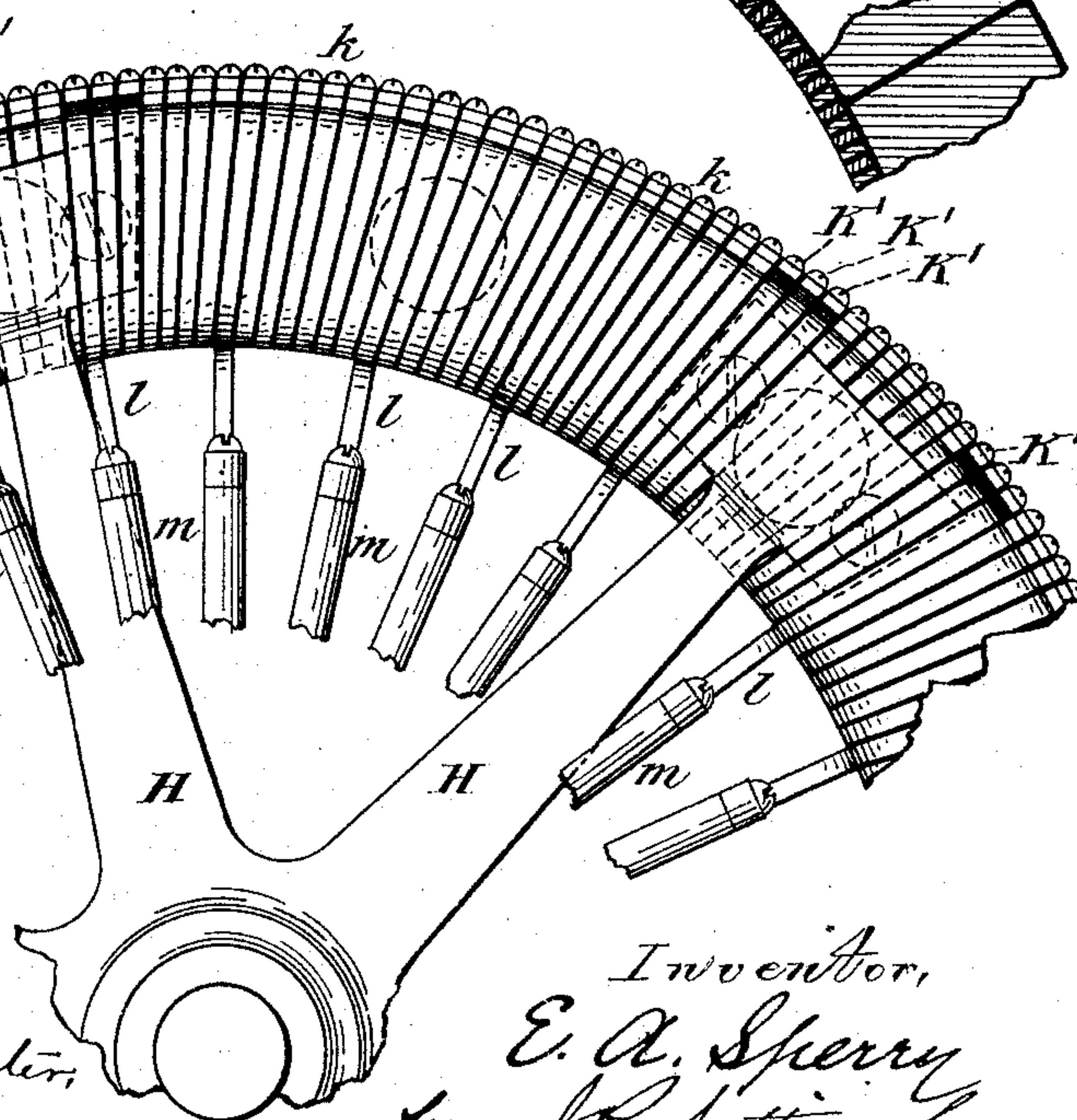
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses,  
Henry Frankfurt,  
L. A. Marceron

Inventor,  
E. A. Sperry  
by R. Nottingham atty



# UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF CHICAGO, ILLINOIS.

## ANNULAR ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 353,989, dated December 7, 1886.

Application filed June 9, 1883. Renewed April 23, 1886. Serial No. 199,988. (No model.)

*To all whom it may concern:*

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Annular Armatures for Electrical Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to annular or ring armatures for magneto-electric generators, its object being to construct an armature of this class which shall be light in weight, while embodying an ample mass of metal to insure a proper inductive effect of the field-magnets, and to provide an armature of this class which shall be durable in construction and not liable to distortions or displacement of its parts by centrifugal force.

20 A further object of my invention is to construct an annular armature in such manner that there will not be produced in its core extra poles having an inductive influence upon its coils adverse to that of the field-magnets and those portions of the armature-core under the direct influence of said magnets.

30 The invention consists in certain novel constructions and combinations of parts, which will be readily understood from the following particular description and the accompanying drawings, in which—

Figure 1 is a transverse section through the armature on one side of its axis, and also through the pole-pieces of the field-magnet. Fig. 2 is a section through a portion of the armature in a plane at right angles to the plane of section in Fig. 1. Fig. 3 is a front view of a portion of the armature.

Referring to Fig. 1, the letters B and B' indicate portions of the pole-pieces of the field-magnet constructed as in Letters Patent No. 260,132, granted to me on the 27th day of June, 1882.

45 The letter A indicates the armature, which is formed of two soft-iron rings, C and C', and a number of metallic segments, D, which are insulated from each other and from the rings by interposed washers E, of insulating material.

50 Referring to Fig. 2, it will be seen that the

segments D, which go to make up a complete circle, are insulated from each other at their ends, as shown at E'. The ends of these segments are in line with those of other segments arranged in series or groups across the armature, as shown in Fig. 1. These segments are provided with holes for the passage of bolts F, which engage the rings C and C', and are insulated from the segments by means of a surrounding covering of insulating material, as shown at E<sup>2</sup>.

I have found that in all annular armatures in which the core forms a continuous metallic circle, or inductive members of the core form such circles, or are composed of endwise-lapping segments, those portions of the core which are immediately under the influence of the poles of the field-magnets have an opposite polarity to such poles, respectively, and the molecular arrangement of the core with reference to polarity is in line of circumference, so that poles opposite to those of the portions next to the field-magnets are produced at other points of the core, these extra poles being usually distributed along the cores at various points other than the proper point of change of polarity due to the opposite influences of the field-magnets, and such extra core-poles exercising an inductive effect upon the armature-coils opposite to that which is exercised by the field-magnets and those portions of the armature-core immediately adjacent to the same. This of course to some extent counteracts the effect of the field-magnets and retards the generation of current. By forming each circle of the armature-core of soft-iron segments, all of which in one circle are in the same plane, but insulated from each other at their ends, I break up the tendency to a polar molecular arrangement of the core in line of circumference, and instead the interior and exterior edges of the segments, both of which are under the direct influence of the same field-pole, have an opposite polarity to said pole, and the longitudinally intermediate portions of said segments have an opposite polarity to their edges. These intermediate polarities exercise no inductive influence on the coils, as their magnetic affinity is satisfied by the opposite polarity of the edges of the segments.



The spider-arms which support the annular armature are indicated by the letter H, and these spider-arms are each provided with T-heads *h*, which are secured to the rings C of the armature by suitable screws.

The entire annular body of the armature is surrounded by a series of closely adjacent loop-like conductors, K, some of which, as shown at K', are sufficiently elongated as also to embrace the end portions of the head of the spider-arms. These loop-like conductors are bent around the armature transversely, and their ends are lapped at the front and secured together by screws, as shown at *k*, the inner edges of said conductors being insulated from the rings C C' by suitable interposed non-conducting material—such as mica or asbestos cloth—and about every seventh one of these loop-like conductors, in the order of their arrangement, is provided with a forwardly-projecting arm, *l*, which is secured to a conducting-arm, *m*, by which electrical connection is made with the commutator sections in the usual manner, which is not illustrated in the drawings.

The conductors K' are slightly separated from each other by ribbons *n*, of non-conducting material, which are passed between the conductors and the segments and folded outward between the latter. Three of these ribbons are shown in the drawings, and the spaces left between them and between the segments enable the air to enter freely between the latter to cool them, and also cause a considerable heat-radiating surface of the segments to be exposed. The insulating washers E are quite limited in area, as shown in Fig. 2, and hold the segments apart in such a manner that between each two segments there will be a considerable open space, thus providing for exposing a large heat-radiating surface of the segments and a free circulation of air between them, which also passes between the conductors K and K'. This separation of the segments also obviates the "Foucault" currents, which are deleterious to the action of the armature having its core composed of a large mass or masses of solid metal.

About the exterior periphery of the armature are wound groups of insulated wires *w w*, which serve to brace the armature against lateral distortion by centrifugal force.

I do not limit myself to grouping the segments in groups in which the segments have their ends all in line transversely, but may have the segments of each group lapping or breaking joints with the segments of adjacent groups on each side, and I may also arrange the segments so that their ends will lap in metallic contact to complete circles, each circle of segments thus arranged being insulated laterally by washers E in the same manner as single segments are, as before described.

The nut *f*, which holds the outer ring, C', upon bolts F, is let in flush with the surface of the ring.

In Fig. 3 I have shown the conductors K and K' having an equal trapezoidal cross-section throughout such portions of their length as are subjected to the action of the field-magnets, whereby I secure a uniform induction in these conductors, while at the same time they are at a uniform distance from each other, this distance being such as will enable the maximum number of conductors suitably insulated from each other to be placed upon the armature.

Having now fully described my invention, what I claim is—

1. An annular armature having a core formed of two laterally-external metallic binding-rings and groups of intermediate thin metallic segments, which are insulated from each other, and the loop-like bar-conductors bent around said core and insulated therefrom, said conductors being connected to a commutator, substantially as set forth.

2. In an annular armature, the combination, with the external rings, C and C', and interposed insulated thin metallic segments held together by suitable bolts to form a core, of the spider-arms H, provided with T-heads secured to the ring C, and suitable conductors arranged about said core and provided with means for electrical connection to a commutator, substantially as described.

3. An annular armature having a core formed of a series of laterally-adjacent circles of flat metallic segments, each circle being insulated from adjacent circles, and the segments of each particular circle being all in the same plane and insulated from each other at their ends, substantially as described.

4. In an annular armature, the combination, with laterally-exterior binding-rings, of a series of rings, each composed of segments of thin sheet-iron lying in the same plane, and insulated from each other at their ends and from laterally-adjacent segments and the binding-rings, insulated bolts which secure the binding-rings in place to clamp the said circles between them, suitable insulated conductors arranged about said core and provided with commutator-connections, and radial arms for supporting the armature as a whole by one of its lateral edges, substantially as described.

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

ELMER A. SPERRY.

Witnesses:

ALLEN A. GRIFFITH,  
CHAS. S. CLEAVER.