(No Model.) 2 Sheets—Sheet 1.

O. A. ENHOLM.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 432,387. Patented July 15, 1890.

Fig. I.

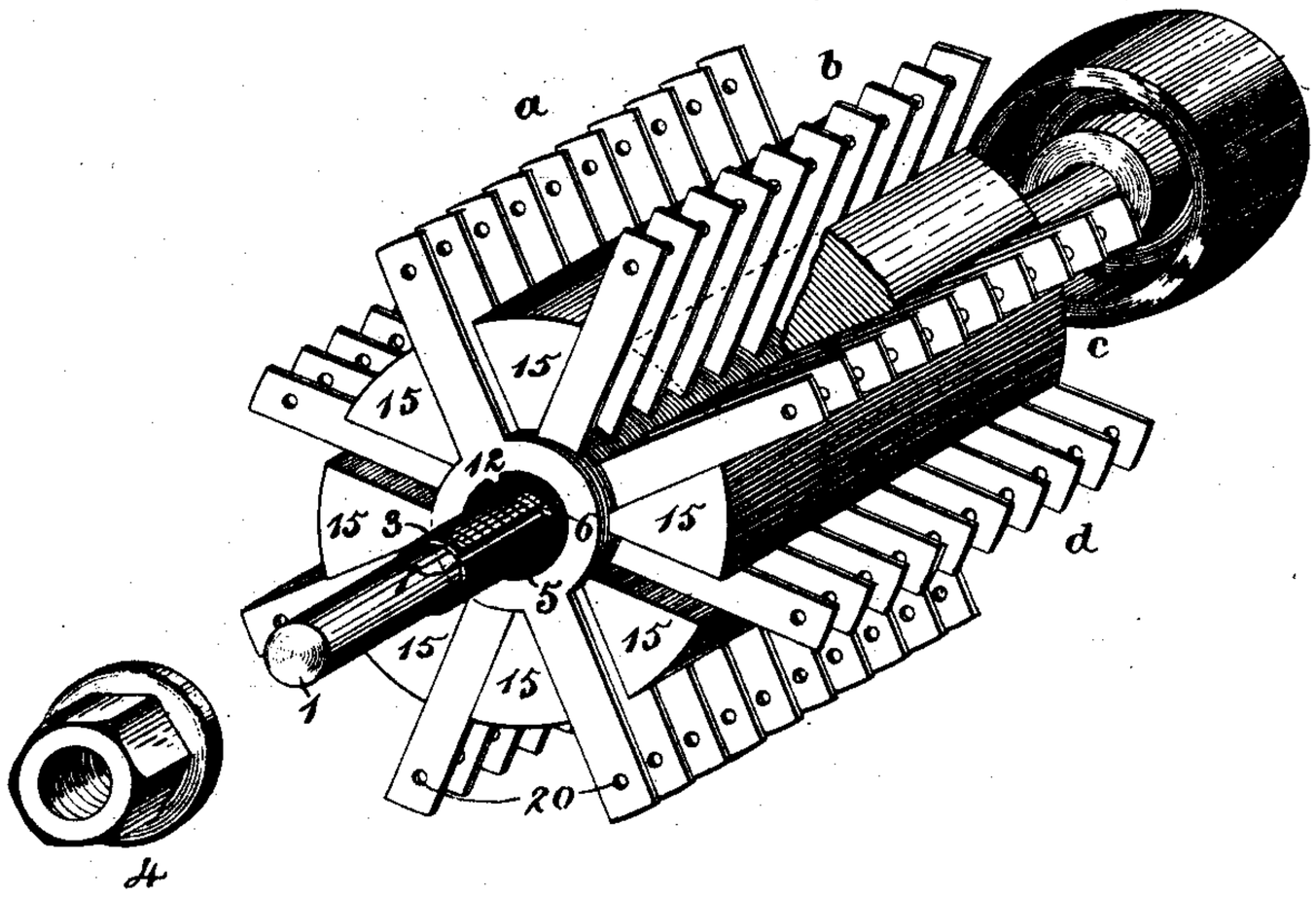
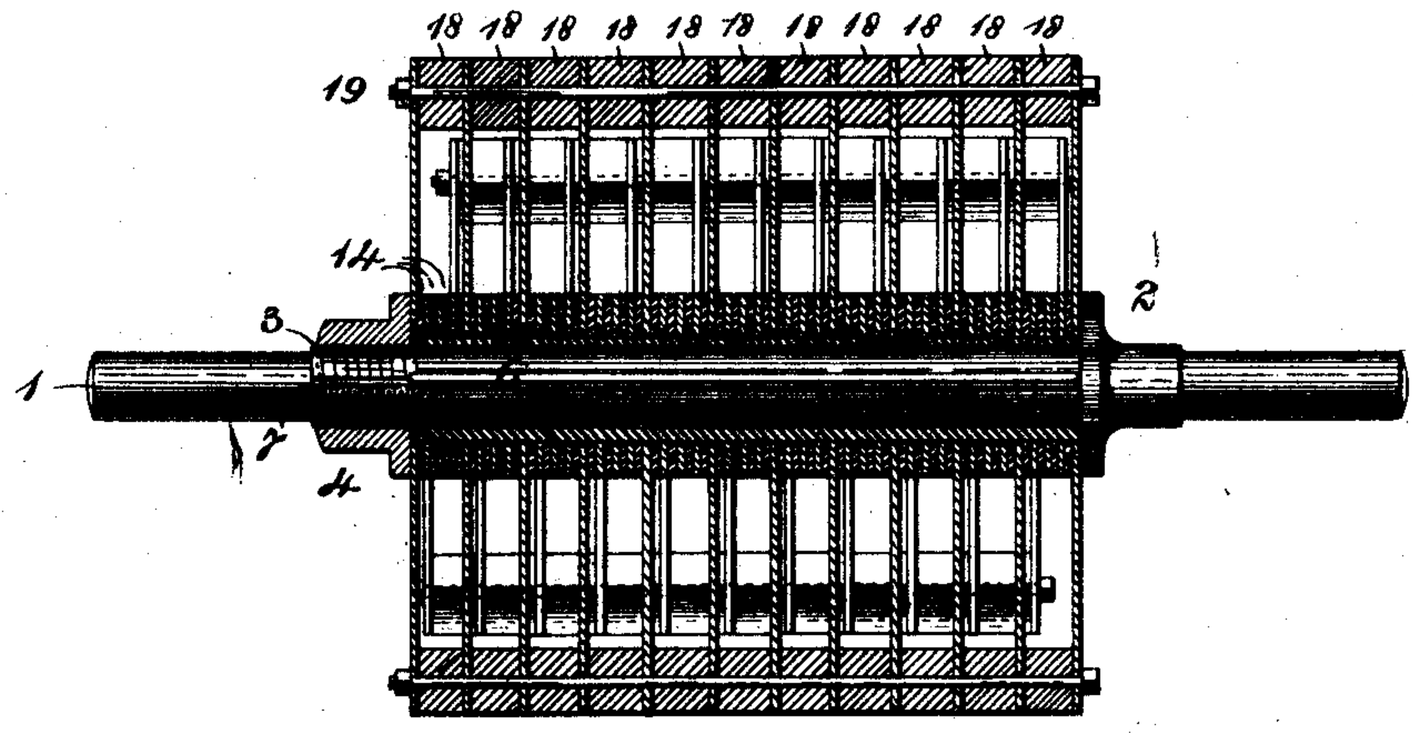


Fig. II.



Witnesses

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Inventor

Oscar Axel Enholm.

By Knight Bros.

Att'vs.

(No Model.) 2 Sheets—Sheet 2.

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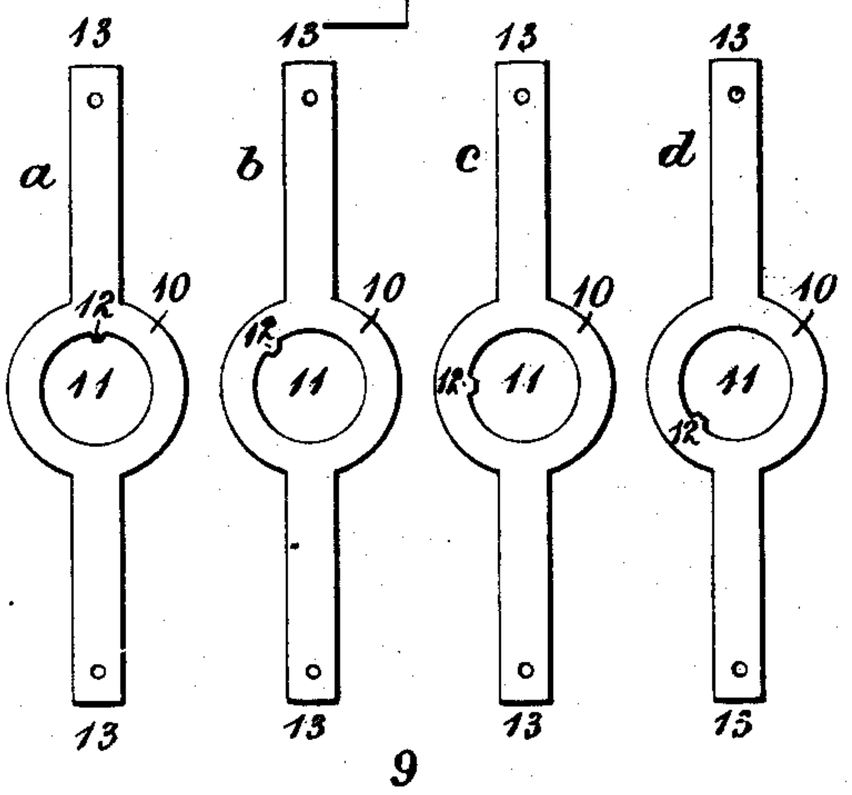
Fig. III.



9

Fig. IV.

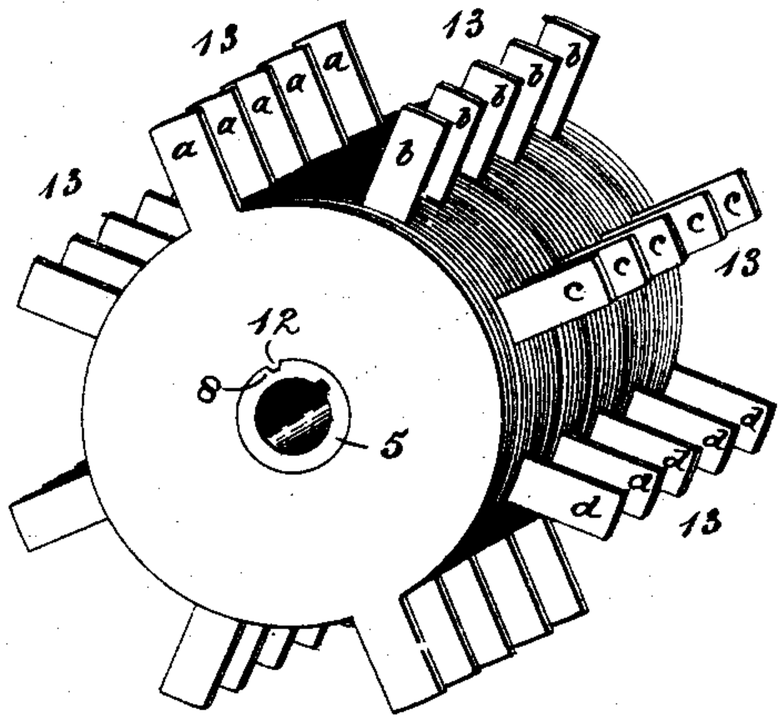


Fig. V.

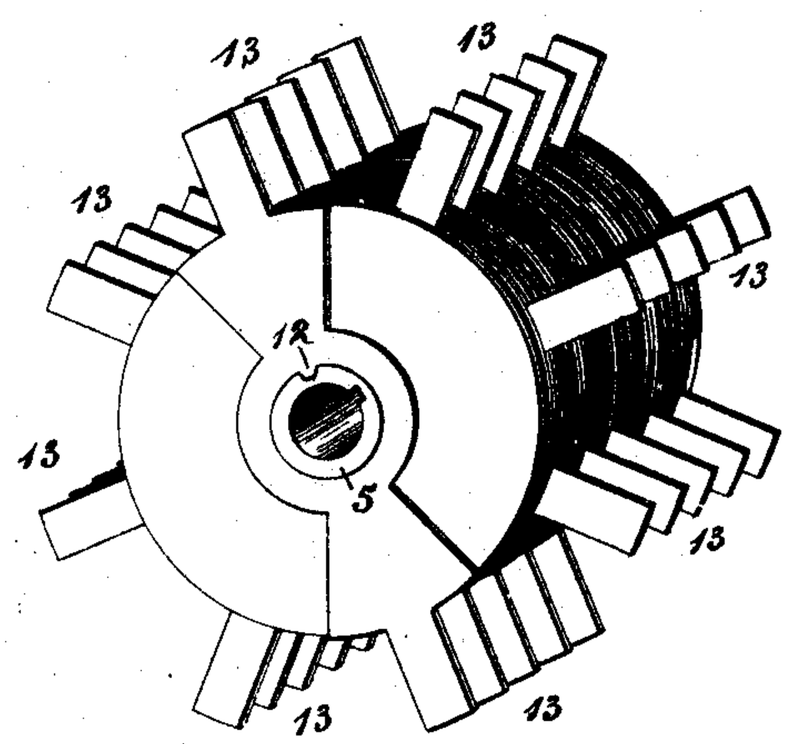


Fig. VI.

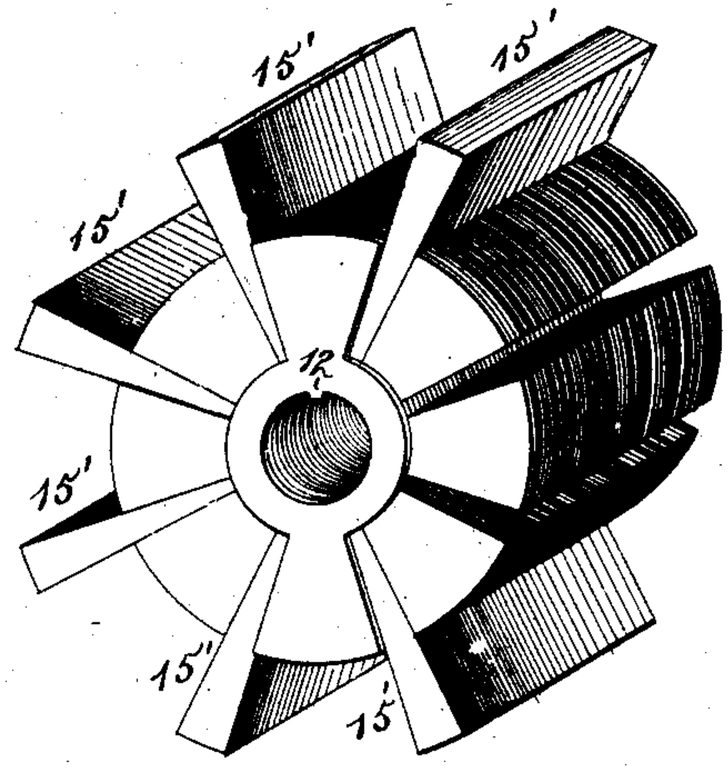
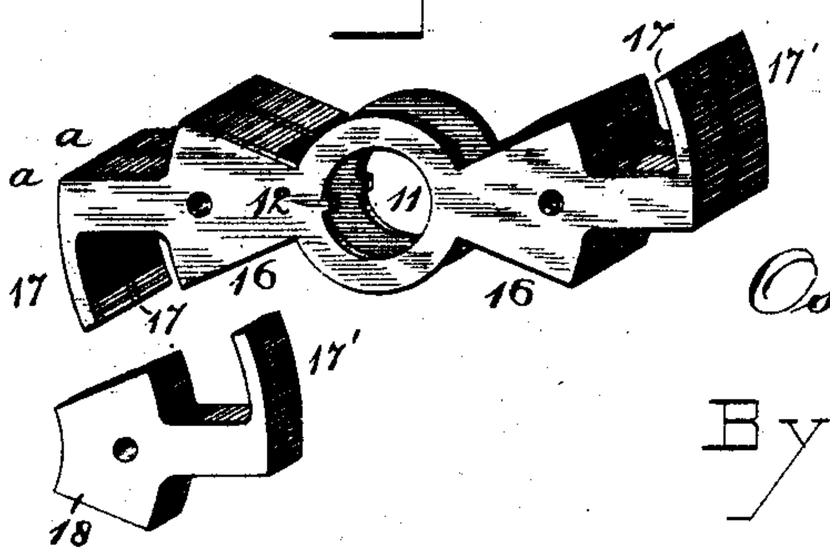


Fig. VII.



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UNITED STATES PATENT OFFICE.

OSCAR AXEL ENHOLM, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO JULIUS M. HEYMAN, OF SAME PLACE, AND EMMANUEL DURET DE BRIE, OF COGNAC, FRANCE.

ARMATURE OF DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 432,387, dated July 15, 1890.

Application filed November 23, 1889. Serial No. 331,349. (No model.)

To all whom it may concern:

Be it known that I, OSCAR AXEL ENHOLM, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in the Armatures of Dynamo-Electric Machines, of which the following is a specification.

My invention relates to an improved construction of the armature-core of a dynamo-electric machine, and is more particularly designed for what are known as "drum-armatures," in which the winding is in meridional planes about the exterior of a cylindrical core.

The object of my invention is to so construct the armature-core that it shall constitute a perfect magnetic bridge between the field-poles, and thus more effectually direct and concentrate the lines of force upon and through the armature, and at the same time be capable of a more ready magnetization and demagnetization as it revolves than are those forms of cylindrical armature-cores that have been heretofore employed. The construction is further such as to prevent the formation of cross or false magnetic action in the core itself.

Referring to the accompanying drawings, Figure I is a perspective view of an armature-core embodying my invention, the polar-connections and a portion of one of the non-magnetic filling-blocks being omitted. Fig. II is an axial section of such armature-core with its polar block-pieces. Fig. III represents four consecutive plates or laminæ, constituting a series. Fig. IV is a perspective view of a modification of my invention. Fig. V is a perspective view of another modification of the invention. Figs. VI and VII are perspective views of other modifications.

The above figures represent the naked armature as it appears before application of the wire.

In carrying out my invention I construct the armature-core of a multitude of disks, plates, or laminæ of soft iron, arranged side by side with interposed non-magnetic gaskets or washers all at right angles to the shaft. Each disk has two diametrically-remote radial spurs or projections, and the successive disks are so disposed as to present said projections in an orderly spiral arrangement with the result of presenting twice as many longitudinal groups or ranks of spurs as there are different kinds of plates. Thus with the four forms of plates shown in Fig. III there will be eight of such ranks of spurs, as represented in Figs. I and II. With a core constructed on my plan the entire substance of the core becomes the theater of lines of magnetic force.

1 may represent any suitable armature-shaft having a collar 2, against which one end of the armature-core abuts, and having a screw-threaded portion 3 for a nut 4, by which the parts of the cores are firmly clamped together.

5 is a brass or other non-magnetic sleeve, having an internal tongue 6, which occupies a key-seat 7 in the shaft, and having an external groove 8 for the reception of lugs upon the core laminæ, now to be described. The core proper is built up of a multitude of similar plates, disks, or laminæ 9 of some ferro-magnetic metal, preferably soft-charcoal iron. Each plate comprises a circular body or hub 10, having a central orifice 11 with an interiorly-projecting lug 12, which, when the core is put together, occupies the groove 8 of the brass sleeve 5. Each plate has two diametrically-opposite spurs or projections 13. The four plates *a b c d* of any given series are precise fac-similes of one another, except that the lug 12, which in one plate *a* is in line with one of these spurs, is in the succeeding plates *b c d*, respectively, forty-five, ninety, and one hundred and thirty-five degrees angular remove to the left of the first-named. The plates of the next series are arranged in like succession, and so on until a core of the desired length is obtained. Between every two consecutive plates is interposed a washer or gasket 14 of varnished Manila paper or other non-magnetic material. The plates which go to make up any given diametrical plane or pair of longitudinal ribs are, it will be seen, separated from one another by the thicknesses of three plates and four washers. Each plate extends

diametrically across from one side of the armature to the other, and is consequently adapted when revolving between the poles of the field-magnet to partially complete the magnetic circuit between said poles. As these plates are straight and any one of them of small mass, each is adapted to be promptly and completely magnetized and demagnetized, and an armature made up of a multitude of such plates is obviously capable of very rapid changes of magnetic condition. To assist in keeping the plate series at their proper angular or diametric displacement and to present a convenient cylindrical body for the wire windings, segmental blocks 15, of wood or other non-magnetic substance, may be inserted. The spurs 13 form virtually polar prolongations of the armature-core. Soft-iron blocks or polar connections 18 may be interposed between the consecutive spurs of each rank and be fastened by a rod 19, occupying orifices 20 in said blocks and spurs.

The above-described form of armature-core is susceptible of various modifications. For example, the hub or annular portion 10 may, as in Fig. IV, be of such diameter as itself to constitute the cylindrical body for the wire winding, and to thus dispense with the wooden segments or filling-pieces 15; or a like object may be attained by wings or lateral expansion 16.

In forms like Fig. VI insulating-wedges—such as 15′—may be employed. The polar surface of each spur may be prolonged by a lip or lateral prolongation 17 concentric with the axis of rotation. The polar connecting-blocks 18 may have like lips or lateral prolongations, as shown at 17′, Fig. VI. The soft-iron pole-piece 18 may be omitted, as in Figs. I, IV, and V. The tongues (or lugs) and the grooves may of course be reversed. For example, a tongue on the shaft may occupy a groove on the sleeve-bore, and a tongue on the sleeve may occupy notches in the plates. The sleeve may be fastened in any other way to the shaft.

It is evident that the construction of the individual plates may be so modified as to make the number of longitudinal ranks of spurs of any even quantity, less or greater than eight—such as, for example, four, six, ten, or twelve. The disposition of the tongues on the individual plates *a b c d* may be such as to group them in a left-hand instead of a right-hand spiral arrangement here shown. It is further evident that on a core such as hereinabove described the winding may be either longitudinal, as specified, (that is to say, meridionally over and over the whole core;) or the armature-wire may be wound helically about each rank of spurs in the form of separate bobbins with radial axes constituted by the respective rank of spurs—one rank to each bobbin.

What I claim as my invention is—

1. An armature-core for a dynamo-electric machine, formed of a number of separate plates, bars, or rods of iron extending diametrically across from one side of the armature-core to the other and arranged in different diametrical planes.

2. An armature-core for a dynamo-electric machine, formed of a series of plates of thin sheet-iron connected to the same shaft and extending diametrically across from one side of the armature to the other, said plates having each two diametrically-projecting spurs, and being so fixed as to present said spurs in different angular positions in groups or series, as shown.

3. An armature-core for a dynamo-electric machine, formed of a number of plates of thin sheet-iron extending diametrically across from one side of the armature to the other, said plates having diametrically-projecting spurs, and being so fixed as to present said spurs in different angular positions and distinct longitudinal ranks, as shown, and being separated from one another by non-magnetic material.

4. An armature-core for a dynamo-electric machine, formed of a number of plates of thin sheet-iron, which extend diametrically across from one side of the armature to the other, in combination with segmental blocks or filling-pieces, substantially as and for the purposes set forth.

5. An armature-core for a dynamo-electric machine, formed of a number of thin sheet-iron plates, which extend diametrically across the shaft, and which have inwardly-projecting lugs, which occupy a grooved non-magnetic sleeve, in combination with said sleeve and shaft, substantially as set forth.

6. An armature-core for a dynamo-electric machine, formed of parallel plates of thin sheet-iron, connected to the same shaft and extending diametrically across from one side of the armature to the other, said plates having each two diametrically-projecting spurs, and being so fixed as to present said spurs in different angular positions in groups or series, as shown, and with the spurs in longitudinal ranks, of which all the plates in each separate rank are connected near their ends and are magnetically separated from all the intervening plates, substantially as set forth.

7. An armature-core for a dynamo-electric machine, formed of parallel plates of thin sheet-iron, connected to the same shaft and extending diametrically across from one side of the armature to the other, said plates having each two diametrically-projecting spurs, and being so fixed as to present said spurs in different angular positions in groups or series, as shown, and with the spurs in longitudinal ranks, of which all the plates in each separate rank are magnetically connected near their ends by interposed polar connections 18 and are magnetically separated from all the intervening plates, substantially as set forth.

8. An armature-core for a dynamo-electric machine, formed of parallel plates of thin

sheet-iron, connected to the same shaft and extending diametrically across from one side of the armature to the other, said plates having each two diametrically-projecting spurs having lateral prolongations 17, and being so fixed as to present said spurs in different angular positions in groups or series, as shown, and with the spurs in longitudinal ranks, of which all the plates in each rank are magnetically connected near their ends by interposed polar connections 18, having lateral prolongations 17′, which correspond with the said spur prolongations, and are magnetically separated from all the intervening plates, substantially as set forth.

OSCAR AXEL ENHOLM.

Witnesses:
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GEO. H. KNIGHT.