

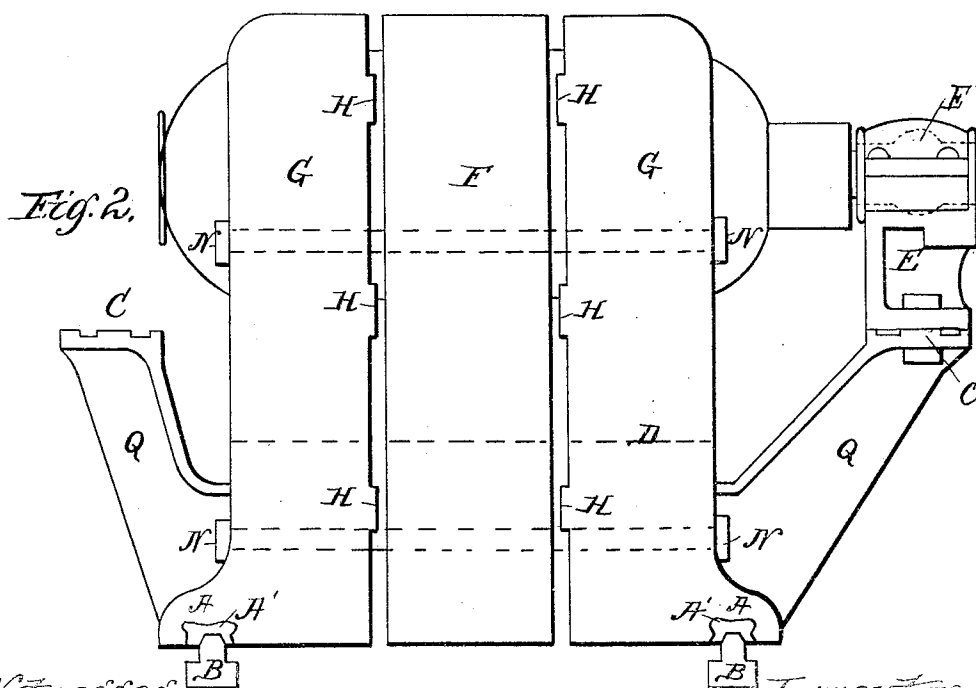
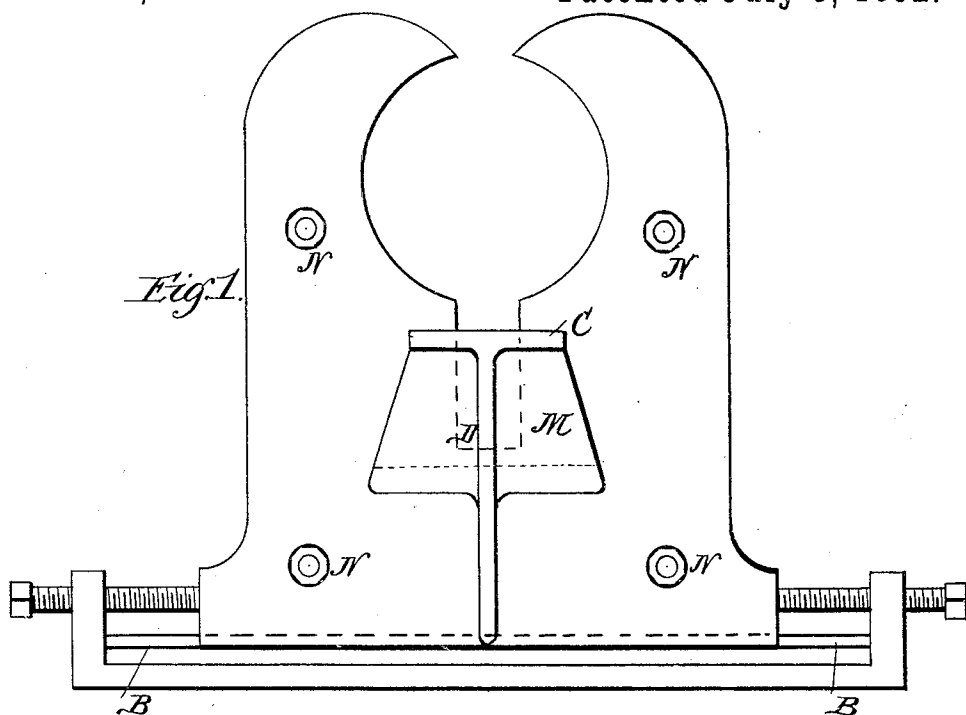
(No Model.)

2 Sheets—Sheet 1.

E. A. SPERRY.
DYNAMO ELECTRIC MACHINE OR MOTOR.

No. 478,142.

Patented July 5, 1892.



Witnesses

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Fig. 3.

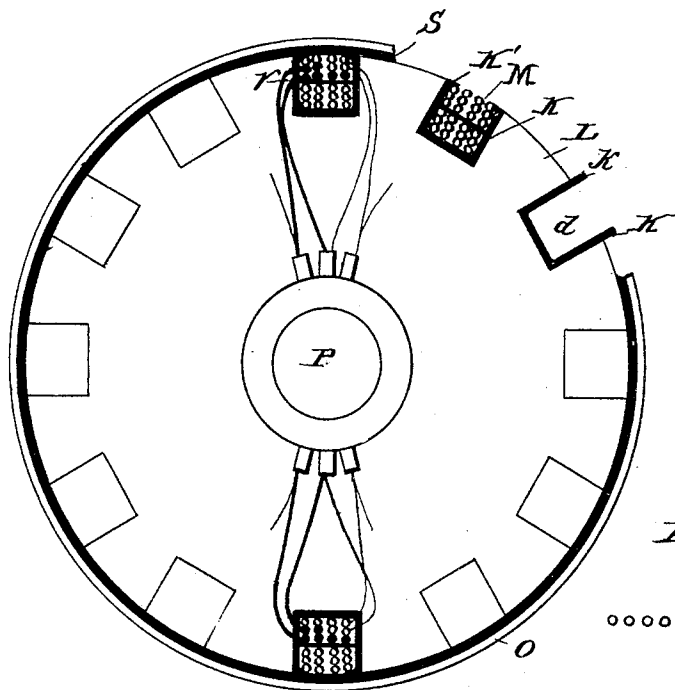


Fig. 5.

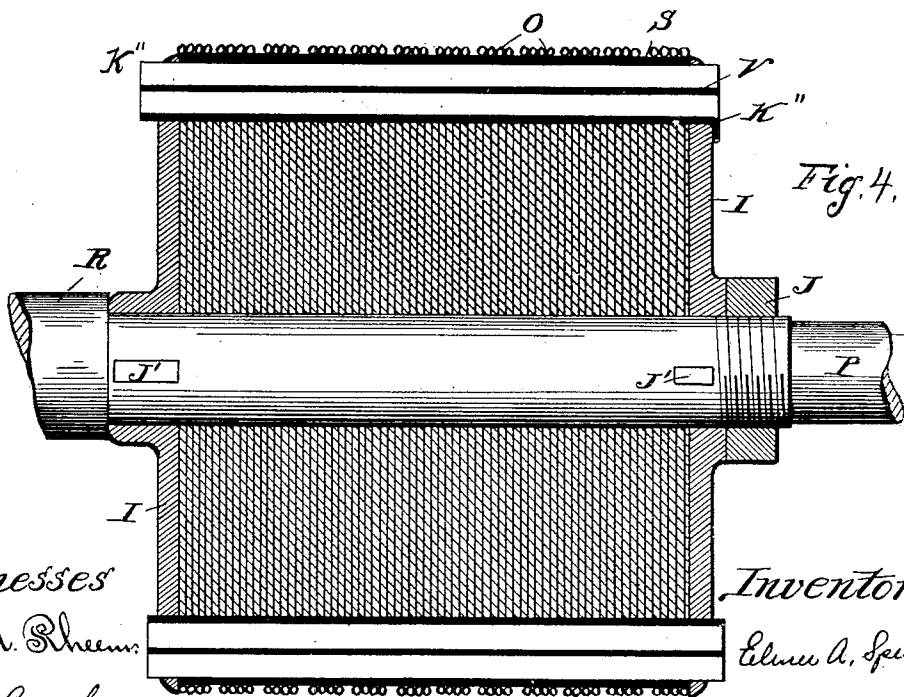


Fig. 4.

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UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF BOSTON, MASSACHUSETTS.

DYNAMO-ELECTRIC MACHINE OR MOTOR.

SPECIFICATION forming part of Letters Patent No. 478,142, dated July 5, 1892.

Application filed November 16, 1891. Serial No. 411,983. (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 a new and useful Improvement in Dynamos or Motors, of which the following is the specification, reference being had to the accompanying drawings, in which similar letters of reference indicate like parts in all the figures.

In the drawings, Figure 1 represents an end view of a dynamo embodying my improvement with the armature and journal-boxes removed. Fig. 2 represents a side view of Fig. 1 and shows the armature in position with one of the journal-boxes. Fig. 3 is a cross-section of the armature, showing the insulation in the grooves and part of the armature-coils. Fig. 4 is a longitudinal section of the armature, showing the parts that I wish to explain here. Fig. 5 shows sections of alternate windings of the band-wires around the armature.

My invention relates to the construction of the field-magnets or body of the dynamo or motor and to the construction of the core of the armature, the winding of the coils thereon, and the insulation of the coils from each other and from the core, the object of my invention being to cheapen and simplify the construction of the various parts.

In the figures the magnet is shown, and consists of two side pieces G and G and an intermediate piece F. These pieces are each cast solid and are without joint in the magnetic path. The side pieces G G have brackets Q cast integral therewith, for the support of the journal-boxes, one of which is shown at E in Fig. 2. In the bottom of these side pieces G G are also cast the way-grooves A A, which are adapted to hold Babbitt metal A' to form a surface for the bearing on the ways B B, upon which the dynamo rests, and slides for tightening the belt.

The intermediate piece F is cast of different thickness for use in dynamos of different sizes, and the parts are held together by bolts N. The surfaces between the side parts G G and the intermediate part F need not be in contact throughout their extent, as the direction of these joints is not across the magnetic

path. To secure a sure bearing of the side parts against the intermediate without the expense of finishing the entire extent of surface between the parts, I provide the chipping-surfaces H on the lateral projections, which in the drawings are shown to be upon the side parts G G, but which may as well be upon the intermediate part F, and, if I desire, I may place them on both. These small chipping-surfaces may be finished and lined with each other by work with cold-chisel and file and form a bearing between the parts which is of certain character and without the necessity of planer or machine work.

The journal-boxes E on the brackets Q are provided with "ball-bearings" E' between the boxes and the journals, forming a universal joint. These journals are oiled in any of the well-known ways and therefore form a species of oil-receptacle. The object of the chipping-surfaces C is to form a bearing for the journal-box without the necessity of planer-work upon the parts, for the slight inequalities of the mechanical work may be compensated for by the self-adjustment of the ball-bearing E' within the journal-box. For the same object in avoiding planer-work on the magnets or body of a dynamo or motor, especially one of very large size, I provide the grooves A A on the bottoms of the side pieces F, in which I place Babbitt metal A' or like metal to form a bearing-surface to rest on the ways B B, and thus by the use of the chipping-surfaces H II between the parts and the chipping-surfaces C on the brackets and the Babbitt-way grooves A A, I am enabled to construct the magnet-frame without planer or machine work on these parts.

In the drawings I have shown both the side pieces G G and the intermediate piece F. This intermediate piece may be of different sizes for different sizes of machines, and in the smallest size may disappear altogether.

The brackets Q Q are cast with the side pieces G G, and the point of attachment of the brackets is below the bottom of the gap D in the horseshoe-shaped casting, which prevents the collection of any oil there.

The armature I construct with a core formed of thin disks having slots *d d*, &c., Fig. 3, for the reception of the armature-coils. These

disks are not secured to each other through the medium of bolts, but are clamped between the two thicker end flanges I I, which are held from rotating on the shaft by means of the keys J', and are forced together by the shoulder R and the nut J on the shaft. The disks forming the structure of the core are mounted on the shaft in the usual way, that shown in Fig. 4 being preferable when the disks are mounted directly on the shaft. In the numerous slots in the periphery of the core are placed the winding-cases K, which are formed of tough firm insulating material, such as vulcanized rubber, rawhide, parchment, or the like. The casings extend through the slots in the end flanges, and being at the greatest possible distance from the shaft, serve to transmit the rotation of the flanges to the disks forming the core. These casings when put in extend radially beyond the periphery of the disks on each side of the slot, and after the windings are made these projecting edges are driven down, as shown at K', Fig. 3, partially covering the coils and giving a large superficial area for the insulation which lies between the iron surface of the disk L and the area at the top of the coil M. Before the coils are wound the casings are bent toward the shaft, overlapping the flanges (shown at K'') and insulating the coils therefrom where the coils bend and turn to cross to the other side of the armature. After the coils are wound the insulation or casing S is provided which covers all the coils, and then the bands O which consist of soft-iron wire are wound and cover nearly the entire surface. Their purpose is both to retain the coils and, being of soft iron, to soften down and prevent the well-known heating which takes place between toothed armatures and pole-pieces, and, furthermore, to reduce the magnetic reluctance of the air-space between the poles and the armature. This band may be wound in two ways, either continuously, each wire being insulated from the other, as shown at Q', Fig. 5, or in small bands insulated from each other and soldered together at O, Fig. 4. The coils are wound in the slots in the casings, coils of opposite potential being wound in the same slot, portions of the same coils passing through the diametrically-opposite slot. The coils are wound either single—that is, a coil of one potential in the same groove with a coil of opposite potential—or they are wound with a group of two coils of one potential in the same groove with a group of two coils of the opposite potential, (shown in Fig. 3,) or this last arrangement may be duplicated.

In Fig. 3 two coils of one potential, meaning those coupled to adjacent segments upon one side of the commutator, are shown wound in the groove inside or below the straight insulating septum, and two coils of the opposite potential, or from the other side of the commutator, are outside this septum. The individuals of each of these groups of two are distinguished from each other, one by a black-

ened circle and the other by an open circle, otherwise the winding is drum-armature winding, pure and simple. The point which I consider as novel lies in the relation of the number and grouping of the convolutions to the size and shape of the grooves. This relation may be briefly stated as follows: The shape and proportion of the slots to the groupings and convolutions of the windings is such that the coils coupled to adjacent segments on one side of the commutator in each slot come out in even layers whether the coils are wound single, in groups of two coils, or in multiple of groups of two. This arrangement enables me to place the flat strip of insulation V between the coils of opposite potential in the same groove, which insulation can be made to fit and bear evenly on the coils, reducing the possibility of cutting through and short-circuiting the coils.

It will be readily understood that the successive coils, having practically the same potential, are coupled to the same side of the commutator.

It has been found in practice that the laterally-protruding arms, no matter how rigidly designed, are liable to have spring when supporting a heavy armature, especially if same be slightly out of balance. It is therefore necessary to provide a universal adjustment or ball-bearing E' at the journal-box when such construction of journal-support is employed, to neutralize the effect of the spring and preserve the perfect alignment of the journal.

I claim and desire to secure by Letters Patent—

1. A magnet frame or body for an electric machine, consisting of a U-shaped casting without joint in the magnetic path and without bed-frame or bed-plate, way-grooves in the body for its support, and brackets integral therewith extending laterally and upwardly from the horizontal portion of the magnet-body for the support of the journals.

2. A magnet frame or body for an electric machine, consisting of a U-shaped casting without joint in the magnetic path and without bed-frame or bed-plate, way-grooves in the body for its support, ways co-operating with such way-grooves for the support of the machine, the two upright portions of the U-shaped body consisting of straight portions for the reception of the magnet-coils, and brackets integral therewith extending laterally and upwardly from the horizontal portion of the magnet-body for the support of the journals.

3. A magnet frame or body for an electric machine, consisting of a U-shaped casting without joint in the magnetic path and without bed-frame or bed-plate, way-grooves in the body for its support, pole-pieces integral therewith, and coil-spools adapted to slip over the pole-pieces, the upright portions of the U of such shape and size as to fill the magnet-spools, substantially as and for the purpose specified.

4. In an electric machine the magnets of which are made up of casting or castings without joint in the magnetic path, without bed-frame or bed-plate, having way-grooves cast therein, and ways adapted to co-operate with the grooves for the support of the machine, the organization being such that the ways are smaller than said grooves, in combination with filling inserted within the grooves between their walls and the surfaces of the ways, substantially as and for the purposes specified.

5. In an electric machine the magnets of which are made up of massive casting or castings of U shape without joint in the magnetic path, an arm cast integral therewith, joining said massive magnet-frame at a point below the upper surface of the horizontal part, protruding outward and bending upward from this point, and a journal-bearing mounted upon the extremity of the arm, the two upright portions of the U being supplied with magnet-coils, substantially as shown and described.

6. In an electric machine, a magnet consisting of a U-shaped casting without joint in the magnetic path, two brackets cast integral with such frame, joining same at a point below the upper surface of the horizontal portion, protruding therefrom outwardly and upwardly, and presenting surfaces at opposite ends of the armature-gap, and journal-supporting cases with concave spherical surfaces resting on such surfaces, in combination with journals with corresponding convex spherical surfaces adapted to rest within the journal-supporting cases, substantially as and for the purposes specified.

7. In a dynamo or motor, an armature the core of which is formed of slotted disks, a slotted flange on each end of the core and insulated therefrom, means for securing the flanges to the shaft and forcing them against the core, and winding-casings in the slots and extending through the flanges, whereby the core is caused to rotate with the flanges.

8. In a dynamo or motor, an armature the core of which is formed of slotted disks, slotted flanges on each end of the core, and winding-casings in the slots extending through the flanges and lapped over the flanges toward the shaft, in combination with the armature-coils.

9. In a dynamo or motor, an armature the core of which is formed of slotted disks, and winding-casings in the slots, which after the coils are wound are driven down at their lateral sides and spread out so as to cover the peripheral area of the coil or a portion thereof.

10. In a dynamo or motor, an armature the core of which is formed of slotted disks, and winding-casings in the slots, said casings formed of material substantially such as described, and which after the coils are wound

are driven down at their lateral sides and spread out so as to cover at least a portion of the peripheral area of the coil, in combination with a casing or insulation S, which covers all the coil and is secured by band-wires O.

11. In a dynamo or motor, an armature the core of which is formed of slotted disks, and coils within the slots, in combination with insulation which covers all the coils and which is secured by bands of soft-iron wire, which wire is wound in narrow bands the convolutions of which are soldered together, such bands being separated from each other by spaces, insulating them thereby from Foucault currents.

12. In a dynamo or motor, an armature the core of which is formed of slotted disks, and winding-casings in the slots, said casings formed of vulcabeston, rawhide, parchment, or any fibrous, tough, hard insulating material, and which after the coils are wound are driven down at their lateral sides and spread out so as to extend over at least a portion of the peripheral area of the coils, in combination with a casing or insulation S, which covers all the coils and is secured by bands of soft-iron wire, which wire is wound in small bands the convolutions of which are soldered together, and the bands separated from each other by spaces insulating them from Foucault currents.

13. In a dynamo or motor, an armature having longitudinal grooves in the periphery of its core and coils of opposite potential wound in each groove, those in any groove being wound through the diametrically-opposite groove, the coils of the same potential in any groove being in groups of two, the size and proportion of the grooves being such that the groups of two coils of the same potential are in whole or part superposed or wound upon each other and come out in even layers, with the coils of the same potential connected to the same side of the commutator.

14. In a dynamo or motor, an armature having longitudinal grooves in the periphery of its core and coils of opposite potential wound in each groove, those in any groove being wound through the diametrically-opposite groove, the coils of the same potential being in groups of two, the size and proportion of the groups being such that the groups of two coils of the same potential are in whole or part superposed or wound upon each other and come out in even layers, with flat strips of insulation between the coils of different potential in the same groove and the coils of the same potential connected to the same side of the commutator.

ELMER A. SPERRY.

Witnesses:

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W. R. GOODMAN.