(No Model.)

T. A. EDISON.

DYNAMO ELECTRIC MACHINE OR MOTOR.

No. 470,926. Patented Mar. 15, 1892.

Fig. 1.

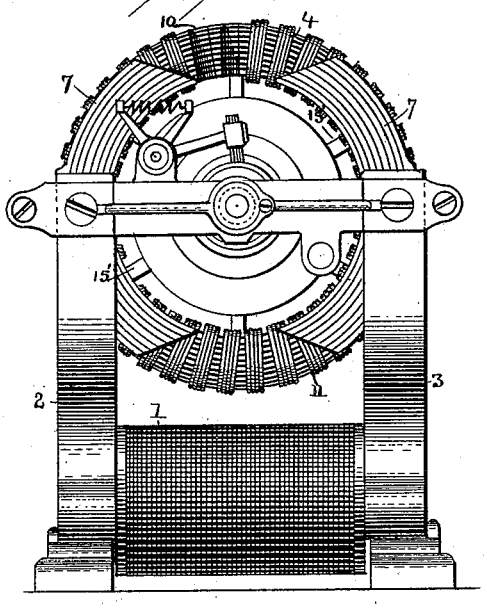


Fig. 2.

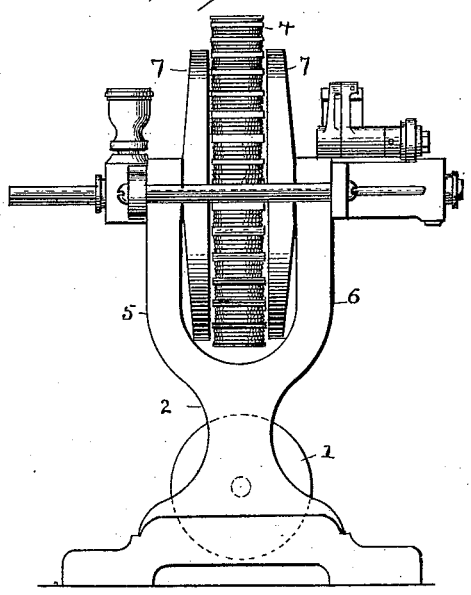


Fig. 3.

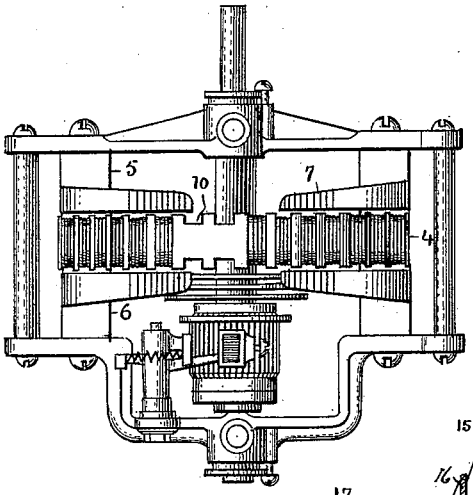


Fig. 4.

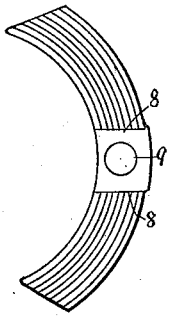
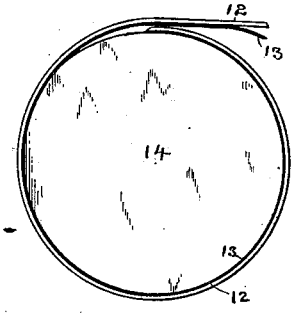


Fig. 5.



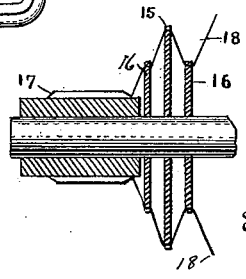


Fig. 6.

Witnesses
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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

DYNAMO-ELECTRIC MACHINE OR MOTOR.

SPECIFICATION forming part of Letters Patent No. 470,926, dated March 15, 1892.

Application filed February 24, 1891. Serial No. 382,338. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Electric Motors, (Case No. 908,) of which the following is a specification.

The present invention relates to the construction of electric motors and dynamos; and it relates especially to the field-magnets and to means for connecting the armature-coils to the commutator-plates.

The invention consists in the field-magnets and in the features of construction and combinations hereinafter described and claimed.

In the accompanying drawings, which illustrate the invention, Figure 1 is a side view of a machine embodying the improvements. Fig. 2 is a view at right angles thereto. Fig. 3 is a plan view thereof. Fig. 4 is a view of a pole-piece detached from its magnet, and Fig. 5 illustrates the manner of winding up the armature-core. Fig. 6 illustrates the resistance-wires connecting the armature-coils with the commutator and means for supporting said wires.

1 is the coil of the field-magnet, and 2 3 are the legs of said magnet. Each leg extends upward and is substantially U-shaped, as shown in Fig. 2, so that an arm of each leg stands on either side of the armature 4. To each arm 5 6 is connected a pole-piece 7 in the form of an arc of a circle. Said pole-pieces are composed of several laminations of iron, as shown in Figs. 1 and 4, and the ends of the pole-pieces terminate in lines at an angle with any radial line extending from the center of the armature. For a portion of the length of the pole-pieces—for example, between the lines 8 8, Fig. 4—the laminations are welded together, so that at this section the pole-piece consists of a solid or integral mass of iron. Through this solid part is a bolt-hole 9 for securing the pole-piece to a leg of the magnet. A bolt passed through this hole and a corresponding hole in an arm 5 6 forms a good mechanical and magnetic connection between the magnet and the laminated pole-piece.

The armature is formed by taking a long band or strip of soft iron 12 of suitable width and winding it, together with a strip of paper 13 or other insulation, into a convolute coil to form a ring of proper size. In making these cores I prefer to wind the strips on a web or disk 14, of wood or any suitable material. The diameter of this disk should be substantially equal to the length of the arms 15', mounted on the motor-shaft, on which the armature is placed after being wound. The radial grooves 10 (see Figs. 1 and 3, in which the winding has been omitted from two grooves to show them) are then formed in the sides of the ring across the convolutions of the bands for the reception of the armature-coils 11 in the ordinary manner.

The circuit connections of the motor are of usual character and need not be specifically described.

With the construction set forth it will be evident that the pole-pieces embrace the armature on two sides in such manner as to act to the best possible advantage on the armature-coil and still leave a large part of the armature exposed to the cooling influence of the air.

I find that by shaping the laminated pole-pieces so that they terminate in lines at a decided angle with the wire forming the armature-coil, as clearly shown in Fig. 1, the magnetic lines are not disturbed during the operation of the motor in such manner as to cause the loud humming noise which is often noticeable in other machines, and by building up the pole-pieces in the manner described heating thereof is almost entirely avoided, notwithstanding the fact that the laminations lie close together and notwithstanding the near approach of the powerful magnetic extensions of the armature-core, and since the laminations are arranged as described the amount of iron in the pole-pieces per unit of area is not diminished.

In my patent, No. 298,955, dated May 20, 1884, I have described a means for preventing hurtful local currents in the armature-coils and sparking at the commutator of dynamo-electric machines. In the present application similar resistances are used in connection with my motor.

In Figs. 6, 15, and 16 are disks, preferably of insulating material and of different sizes and alternately arranged, as shown. These

disks are perforated, notched, or provided with other means for holding wires around their peripheries. 17 are commutator plates or strips, and 18 are resistance-wires, of German silver or other suitable material, extending from the armature-coils to each of said strips. Owing to the fact that the disks are of different sizes and the wires are led first to the periphery of a disk of one size and then to the periphery of a disk of different size, a long conductor can be employed to furnish the required resistance, and owing to the length a comparatively large wire can be used to give the required carrying capacity. Moreover the several wires are held so that they are exposed to the air throughout practically their whole lengths, and consequently the heat generated is rapidly dissipated.

Having thus described the invention, what I claim is—

1. A magnet pole-piece consisting of several distinct layers of iron or steel united for a part of their length into an integral mass, substantially as described.

2. The combination, in a motor, of an armature and a field-magnet having pole-pieces laminated for a part of their length and solid for a part of their length, the laminations being in contact throughout their length, substantially as described.

3. A field-magnet for motors or dynamos, the legs of which are substantially U-shaped, and a pole-piece on each arm of the U-shaped parts, substantially as described.

4. A field-magnet for motors or dynamos, the legs of which are substantially U-shaped, and a laminated pole-piece on each branch of the U-shaped parts, substantially as described.

5. The combination, with an armature having suitable coils, of a field-magnet having laminated pole-pieces the ends of which terminate in lines at an angle with the coils of the armature, substantially as described.

6. The combination of a ring-armature having coils wound thereon, of a field-magnet having laminated pole-pieces the ends of which terminate in lines at an angle to radii of the armature, substantially as described.

7. The combination, with a laminated ring-armature core having grooves in its sides and coils wound thereon, of a field-magnet having pole-pieces the ends of which are inclined to prevent or reduce humming, substantially as described.

8. The combination, in an electro-dynamic machine, of an armature having suitable coils, a commutator, high-resistance conductors connecting the coils and commutator-sections, and a supporting disk or disks for said conductors, substantially as described.

9. The combination, in an electro-dynamic machine, of an armature having suitable coils, a commutator, resistance-conductors connecting the coils and commutator-sections, and insulating-disks between the armature and commutator and supporting or holding the conductors, substantially as described.

10. The combination, in an electro-dynamic machine, of an armature having suitable coils, a commutator, resistance-conductors connecting the coils and commutator-sections, and insulating-disks of different sizes between the armature and commutator, the conductors being led to the peripheries of the successive disks, substantially as described.

11. The combination, with an armature, commutator, and connecting-wires, of disks of different sizes alternately arranged and having around their peripheries means for securing the connecting-wires in place, substantially as described.

This specification signed and witnessed this 4th day of February, 1891.

THOS. A. EDISON.

Witnesses:
E. J. BERGGREN,
L. O. WEBER.