No. 638,635. Patented Dec. 5, 1899.

G. HEIDEL.

DYNAMO ELECTRIC MACHINE OR ELECTRIC MOTOR.

(Application filed Mar. 1, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. I.

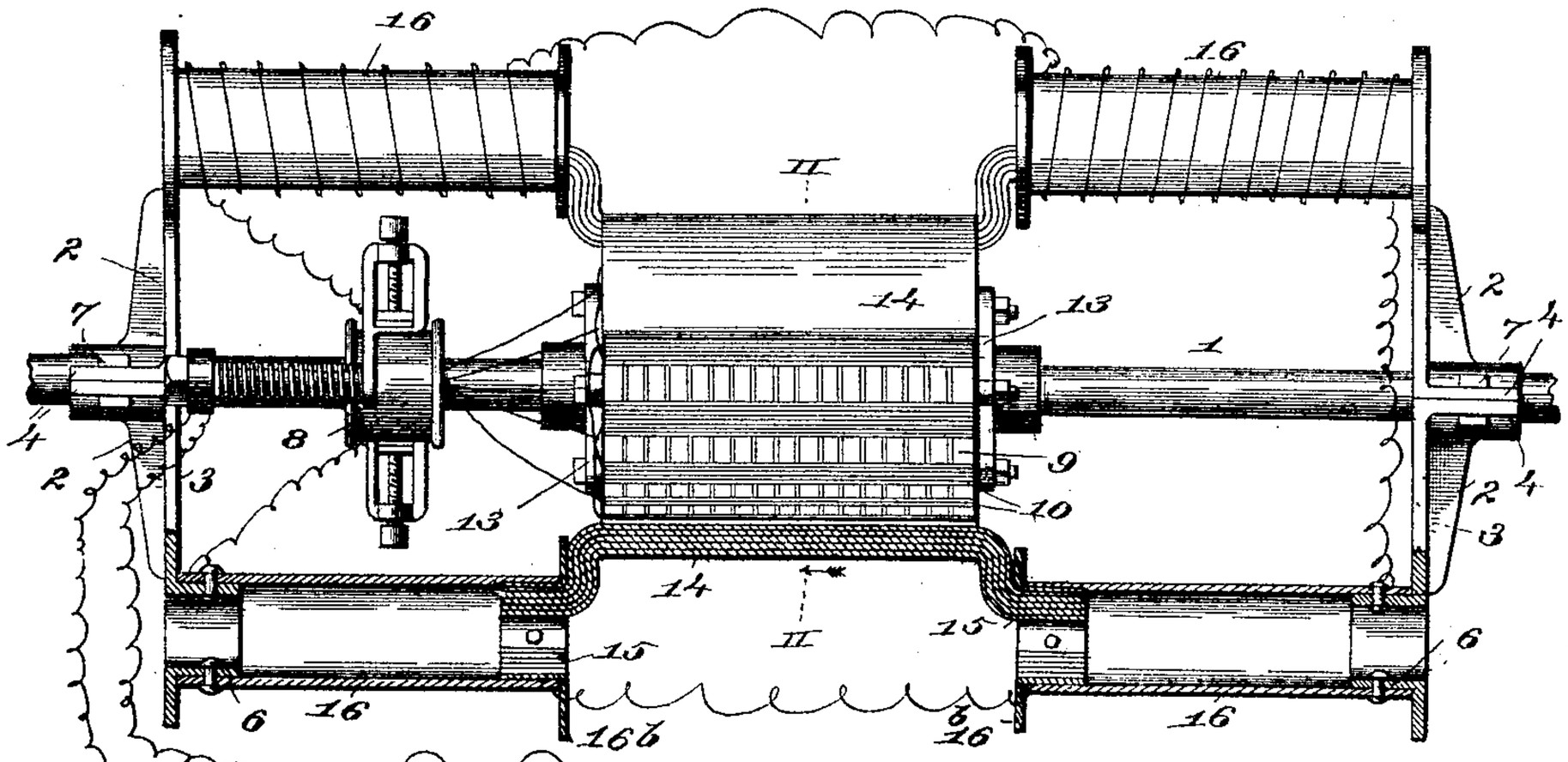

Fig. II.

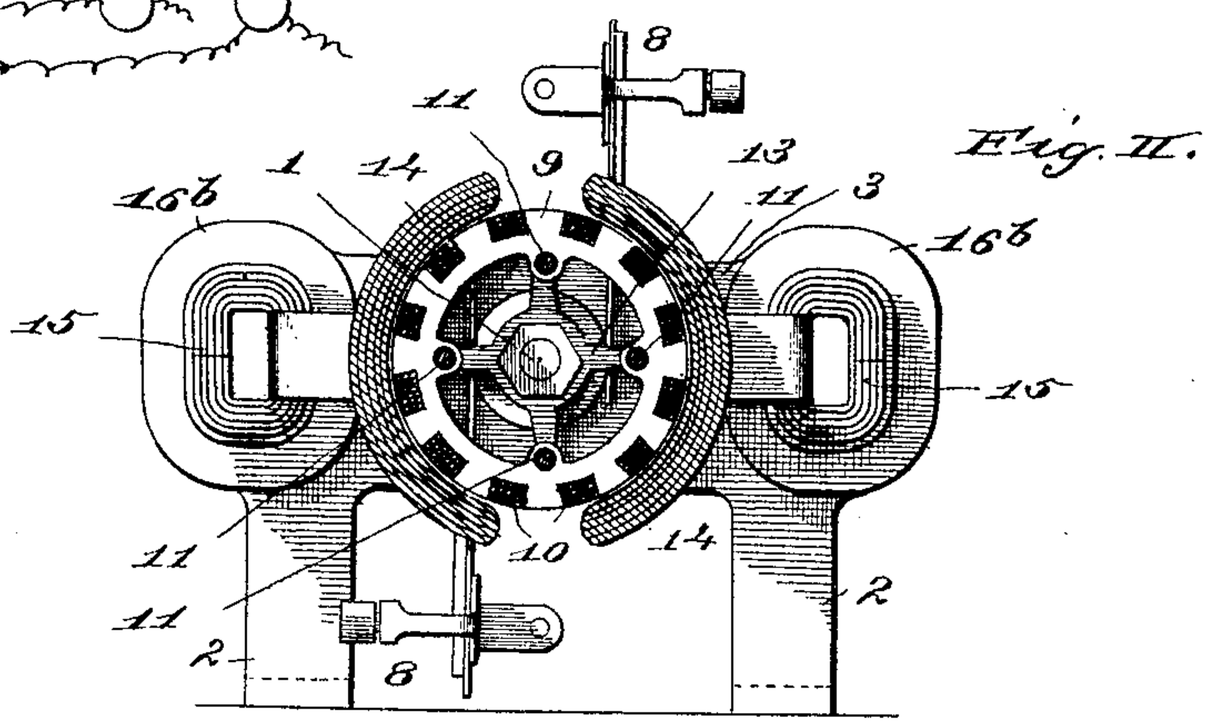

Fig. III.

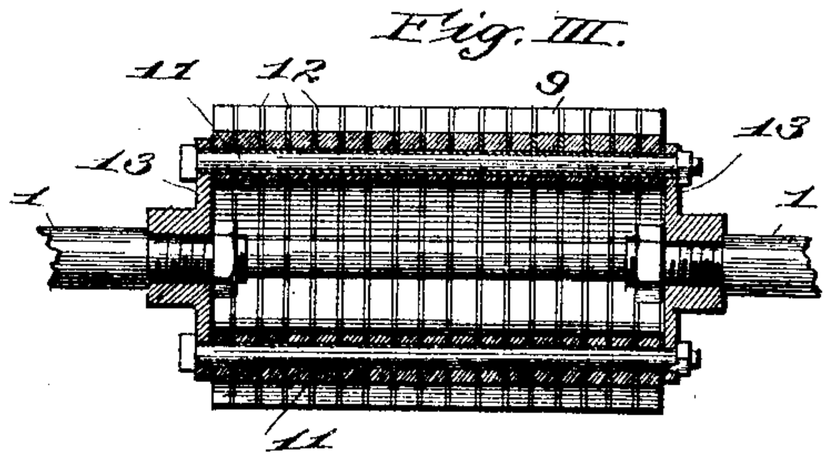

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Fig. IV.

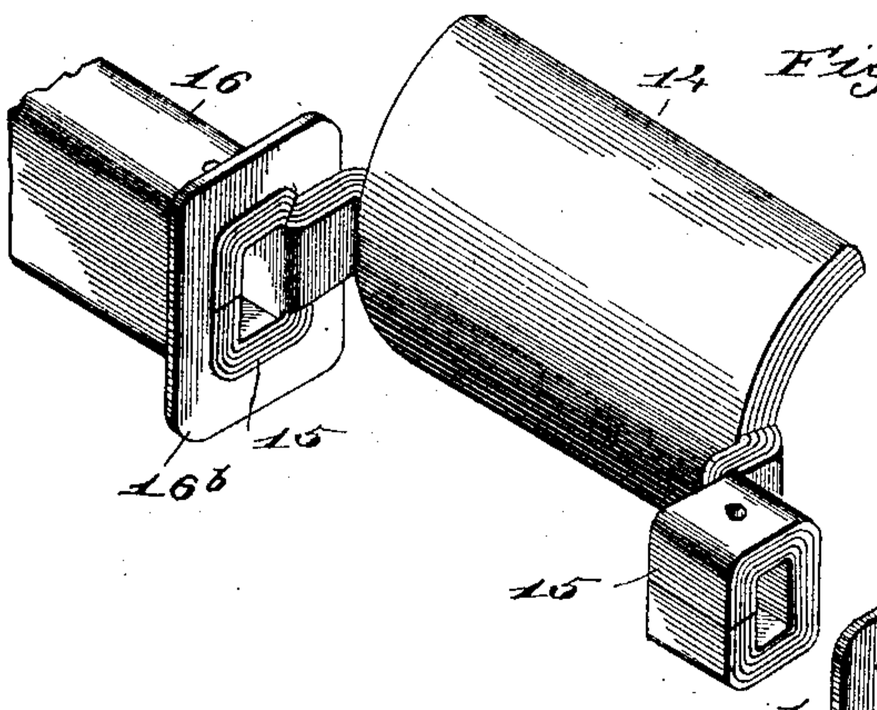


Fig. V.

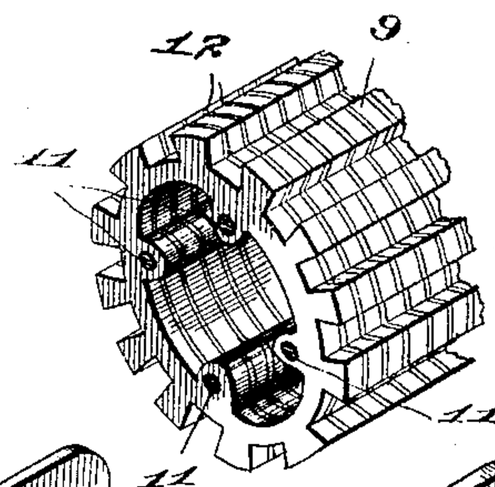


Fig. VI.

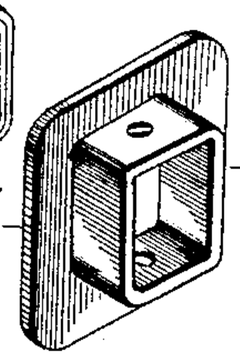


Fig. VII.

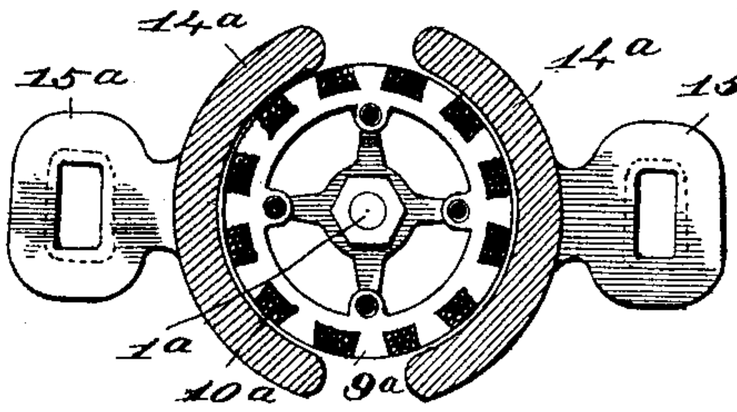
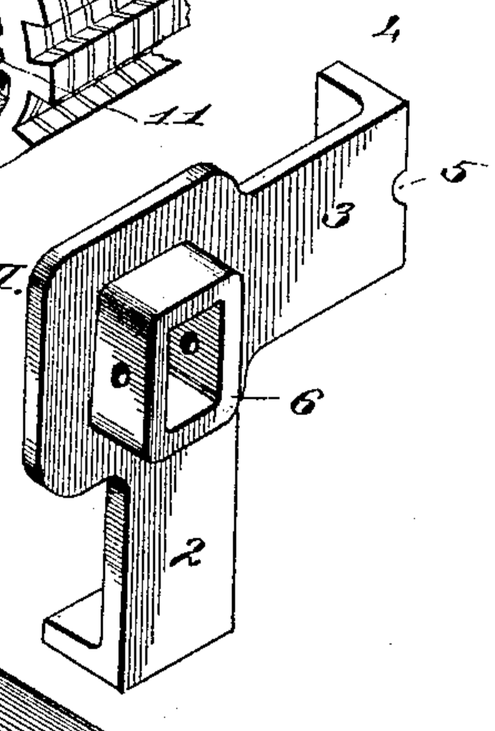


Fig. VIII.



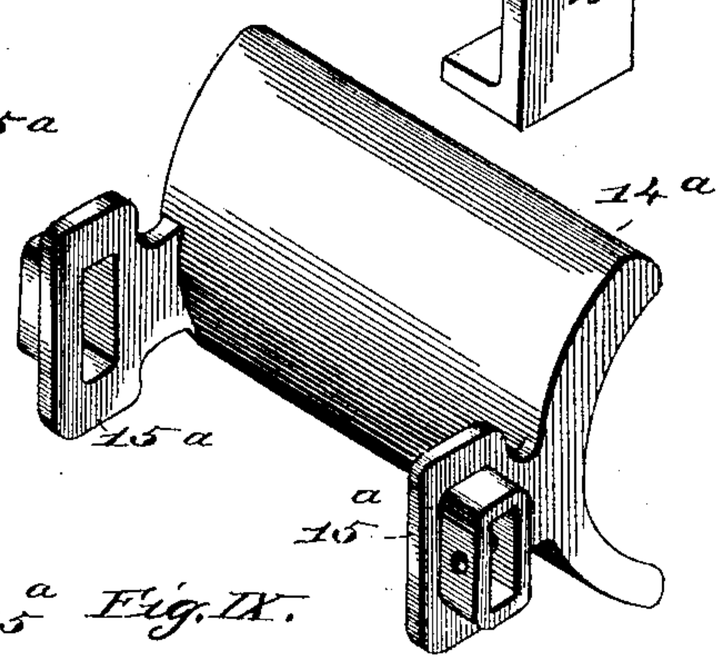
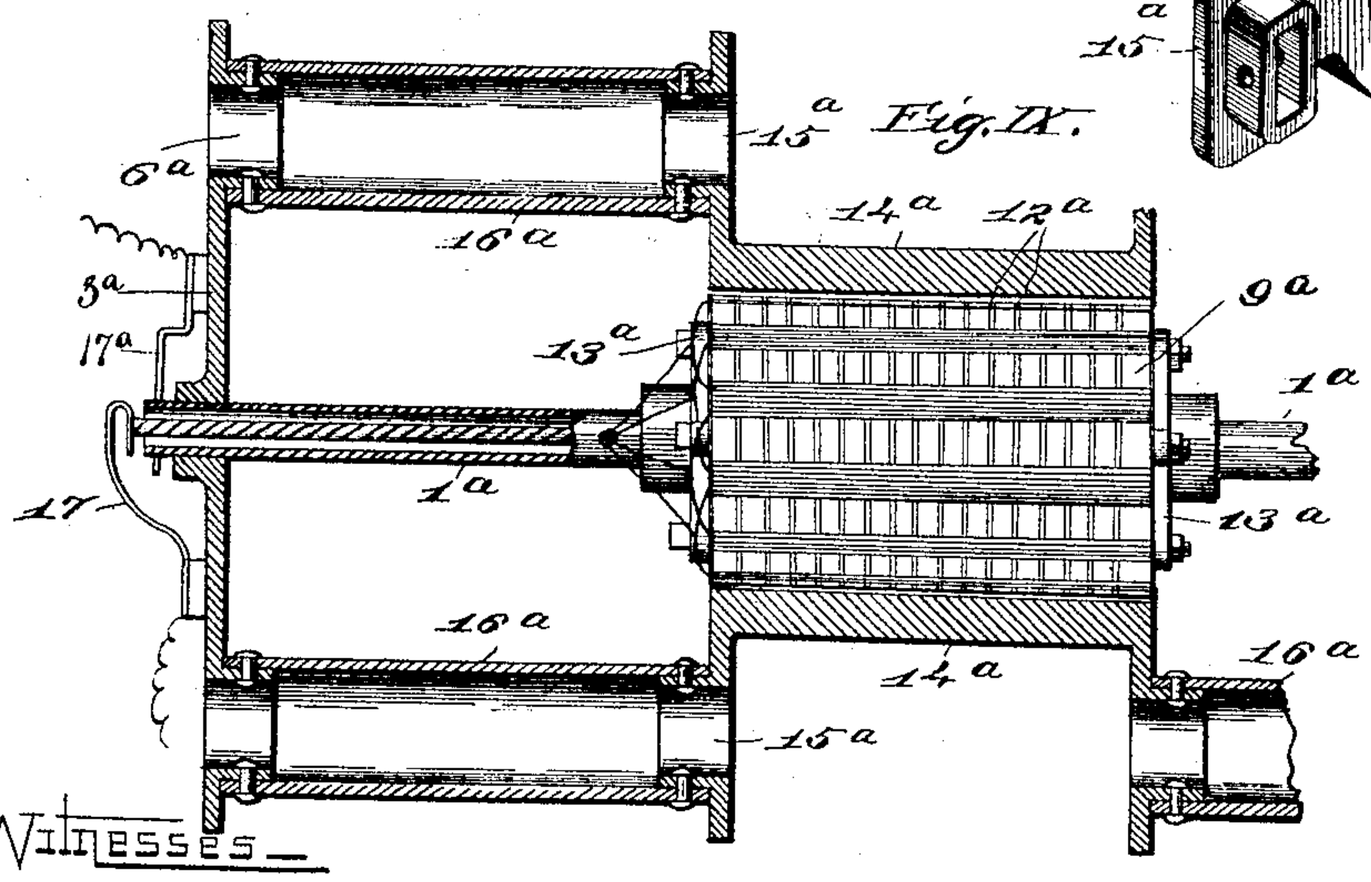


Fig. IX.



Witnesses—

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UNITED STATES PATENT OFFICE.

GUSTAVOS HEIDEL, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE GLOBE ELECTRIC COMPANY, OF SAME PLACE.

DYNAMO-ELECTRIC MACHINE OR ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 638,635, dated December 5, 1899.

Application filed March 1, 1899. Serial No. 707,350. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVOS HEIDEL, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Dynamos or Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a novel construction of dynamos or motors; and it consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a view of my improved dynamo or motor, shown partly in plan and partly in horizontal section. Fig. II is a view taken on the section-line II II, Fig. I, and showing parts of the dynamo or motor in end elevation. Fig. III is a longitudinal sectional view of the armature. Fig. IV is a detail perspective view of one of the pole-plates and field-core-carrying arms projecting from said pole-pieces and a fragment of one of the field-cores. Fig. V is a detail perspective view of one end of the armature-frame. Fig. VI is a perspective view of one of the supporting-frame brackets. Fig. VII is a cross-sectional view taken through the armature and a modified form of pole-plates. Fig. VIII is a perspective view of one of the pole-plates shown in Fig. VII. Fig. IX is a horizontal sectional view of a dynamo or motor equipped with the pole-plates shown in Figs. VII and VIII and showing the armature-wires extending from the armature to a contact from which the electric current may be drawn instead of using the commutator shown in Figs. I and II.

1 designates the armature-shaft, which is mounted in sectional supporting-standards 2. One of these standards is shown in detail in Fig. VI, and they are each composed of an upright leg having a horizontal arm 3, provided with a flange 4, containing a semicircular recess 5, whereby when the two meeting standards are placed together with their flanges 4 opposing each other the recesses 5 are brought together and form a journal-seat for the armature-shaft. Each standard 2 is provided with a hollow protuberance 6, the purpose of which will be hereinafter set forth. The standards 2 are secured together by bolts 7. (See Fig. I.)

On the armature-shaft is the usual commutator 8. The armature is composed of a plurality of skeleton sections 9, having notches in their periphery to receive the armature-wires 10, which are laid therein. The sections 9 are mounted on connecting-rods 11, that extend through the entire series of sections, and interposed throughout the armature between the various sections are rings 12, of insulating material, thereby insulating the sections from each other. The rods 11 are connected at each end to a spider 13 on the armature-shaft, through means of which the entire armature is held, and thereby providing for circulation of air through the interior of the armature, so that the armature may be kept cool.

14 designates pole-plates mounted beside the armature. These pole-plates may be composed of layers of metal, as shown in Figs. I, II, and IV, or they may be of solid form, as shown in Figs. VII, VIII, and IX. Where the pole-plates are made of layers of metal, they are provided with arms 15, struck from the same layers and bent outwardly and turned into hollow form by bringing the edges of the series of layers together, as shown in Fig. IV, so that an aperture is formed through said arm for the circulation of air through the field-cores 16, mounted on said arms and secured thereto by pins or other suitable means of fastening. The opposite ends of the field-cores are supported on the protuberances 6, projecting from the inner faces of the supporting-standards 2. The field-cores are wrapped with the field-wiring in the usual manner, as shown in Fig. I, and held in place by flanged collars 16^b. Where the pole-plates are formed of single pieces, as shown in Figs. VII, VIII, and IX, the arms 15^a are cast thereon and are of hollow form, as in the instance where the pole-plates are composed of layers.

The field-cores 16 and 16^a are arranged, as clearly shown in Figs. I and IX, in pairs parallel with the pole-plates 14 and also parallel with the armature. Each field-core is hollow

throughout its length, so that a free circulation of air may be constantly passing therethrough for the purpose of keeping down the temperature of the field-cores and their winding. I have discovered that with the use of field-cores of hollow form I am enabled to acquire a greater efficiency in the dynamo or motor than with the use of solid cores, as heretofore employed, inasmuch as the circulation of air permitted through the hollow core results in less heat being constantly present therein, and for this reason an increase of energy is given off from the fields instead of being consumed in the heating of the cores. By arranging the field-cores in pairs and parallel with the armature and the pole-plates and at the ends of the pole-plates the circuit from the fields to the pole-plates enters the pole-plates from each end thereof and is taken up to the armature-winding throughout the entire length of the armature instead of entering the pole-plates at their sides from the ends of the fields, as has heretofore been necessary according to the constructions used, in which arrangement the current in strength of any degree passes to the armature from only a limited portion and is therefore incapable of the efficiency that I acquire by the arrangement of field-cores located parallel with the pole-plates and armature.

In Fig. IX, I have shown the armature-wires extending downwardly through the armature-shaft 1^a from the armature to a contact 17 and bearing against said contact, thereby dispensing with the use of the commutator shown in Figs. I and II. In this arrangement the circuit is completed through a contact-brush 17^a, bearing against the protruding portion of the armature-shaft 1^a. By this arrangement the current may be taken directly into this contact instead of the necessity of using a commutator.

I claim as my invention—

1. In an electric dynamo or motor, the two-part end standards divided in a vertical plane and comprising the upright legs each having a horizontal arm 3 provided with a forwardly-projecting vertical flange 4 containing a semicircular recess 5, which recess, when the two parts of the standards are placed together, form a journal-seat for the armature-shaft.

2. In an electric dynamo or motor, an end standard formed of two parts each comprising the upright leg 2, the horizontal arm 3 formed with one-half of the journal-bearing seat for the armature-shaft, and the projection 6 at the intersection of the upright and horizontal portions, affording support for the field-magnet; substantially as herein explained.

3. In an electric dynamo or motor, a standard formed of two parts each comprising the upright and horizontal portions and formed with journal-bearing seats at the ends of the horizontal portions, and with hollow protuberances 6 at the intersection of the upright and horizontal members; substantially as herein explained.

4. In an electric dynamo or motor, the combination of the end standards provided with armature-shaft bearings and with inwardly-projecting protuberances 6, an armature provided with a shaft supported in said standards, and a field-magnet supported between the said protuberances on the standards and with its poles in proper relation to the armature; substantially as herein explained.

5. In an electric dynamo or motor, the combination of the end standards, an armature having its shaft journaled in said end standards, inwardly-projecting protuberances on the respective sides of each end standard, and a field-magnet comprising four windings with hollow cores fitting upon the protuberances and thereby supporting the field-magnet upon the standards; substantially as herein explained.

6. In an electric dynamo or motor, the combination of the end standards providing journal-bearings and inwardly-projecting field-supporting protuberances, a field-magnet having a plurality of windings upon hollow cores, supported between the standards by the protuberances entering the hollow cores, and having pole-pieces suitably conforming to the armature and provided with supporting and magnetic conducting projections which enter the inner ends of the hollow cores.

7. In an electric dynamo or motor, the combination of a suitable frame, an armature mounted therein, the pairs of magnets having hollow cores, and pole-pieces having projections extending within the hollow cores, and thereby rigidly connecting each pole-piece with two cores and making a rigid self-supporting structure of the magnet whereby it may be mounted at its respective ends upon the frame of the machine; substantially as herein explained.

8. In an electric dynamo or motor, hollow field-magnet cores and pole-pieces having integral projections entering the hollow cores of the field-magnet; substantially as herein explained.

9. The herein-described pole-piece for field-magnets or motors or dynamos, shaped to conform to the armature and having an integral projection by means of which it is attached to the core of the field-magnet; substantially as explained.

10. The herein-described pole-piece for field-magnets or dynamos or motors, made up of layers of metal to provide a laminated structure; the layers being provided with projections bent to form hollow attaching-arms; substantially as herein explained.

11. In combination with a hollow core of a motor or dynamo field-magnet, a pole-piece provided with a connecting-arm formed with

a hollow attaching projection which enters the hollow core of the field-magnet; substantially as and for the purposes set forth.

12. In a dynamo or motor, the combination of the standards having inwardly-extending protuberances of hollow construction, pole-pieces provided with attaching-arms having hollow attaching projections opposed to said protuberances, and hollow field-magnet cores fitting the attaching parts which project from the standard and the pole-pieces; substantially as herein explained.

GUSTAVOS HEIDEL.

In presence of—
E. S. KNIGHT,
G. A. TAUBERSCHMIDT.