No. 737,253. PATENTED AUG. 25, 1903.

H. LINDENBERGER.

ELECTRIC MOTOR.

APPLICATION FILED JULY 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. I.

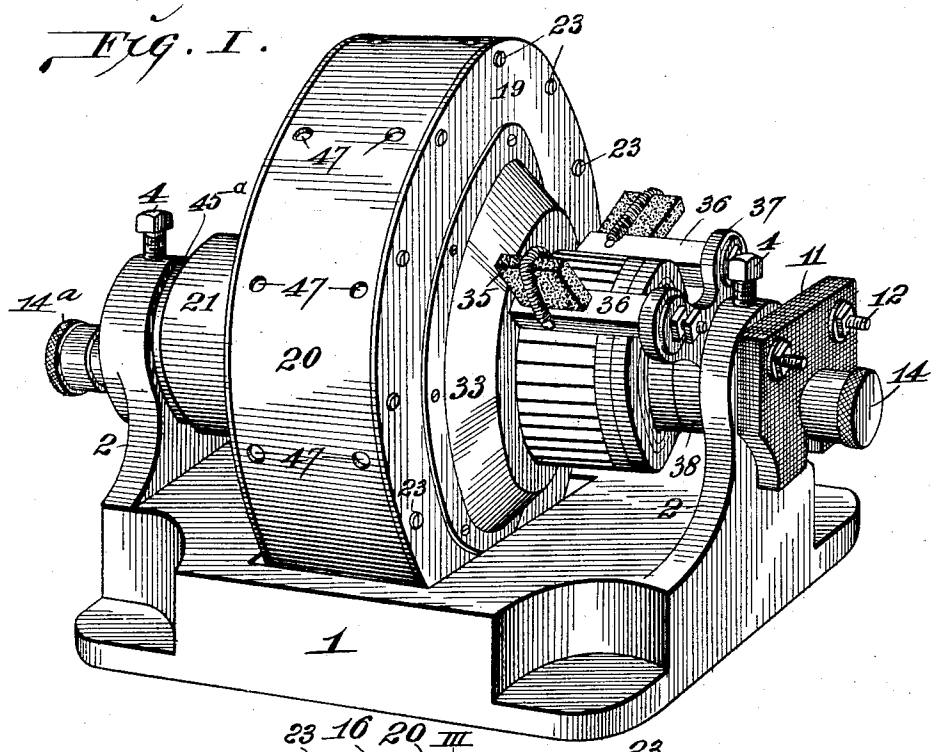
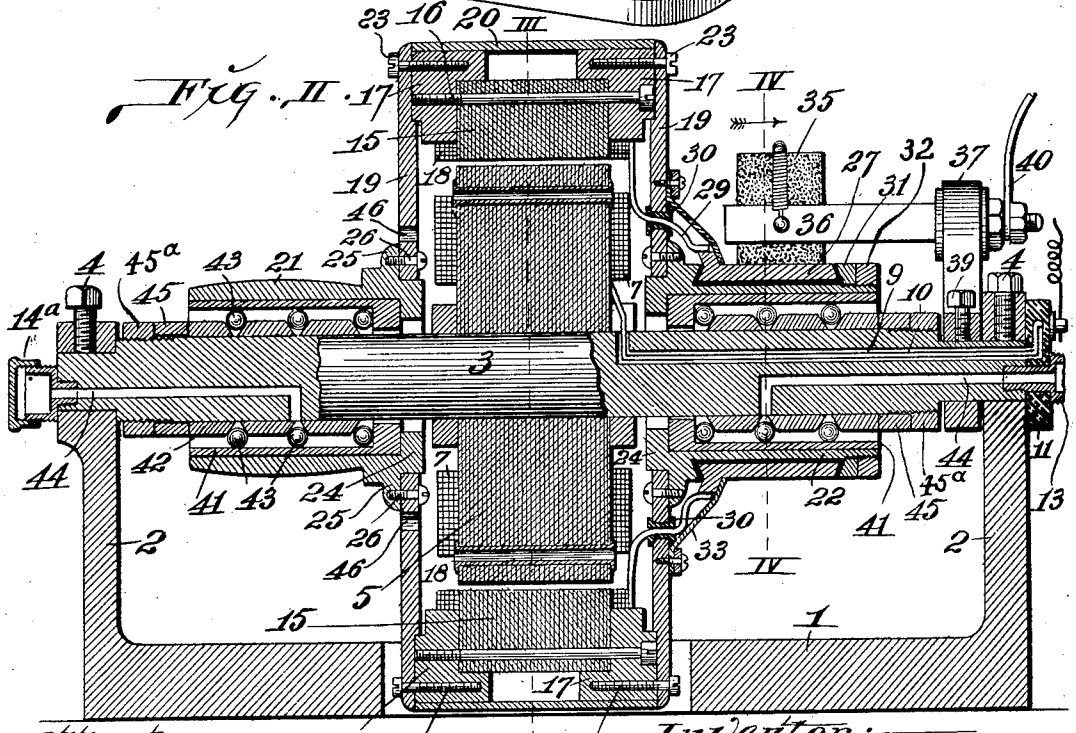


FIG. II.



Attest:—
M. Smith,
E. S. Knight.

Inventor:—
Harry Lindenberger;
By Wright Bro atty's

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 737,253. PATENTED AUG. 25, 1903.

H. LINDENBERGER.

ELECTRIC MOTOR.

APPLICATION FILED JULY 26, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

FIG. III.

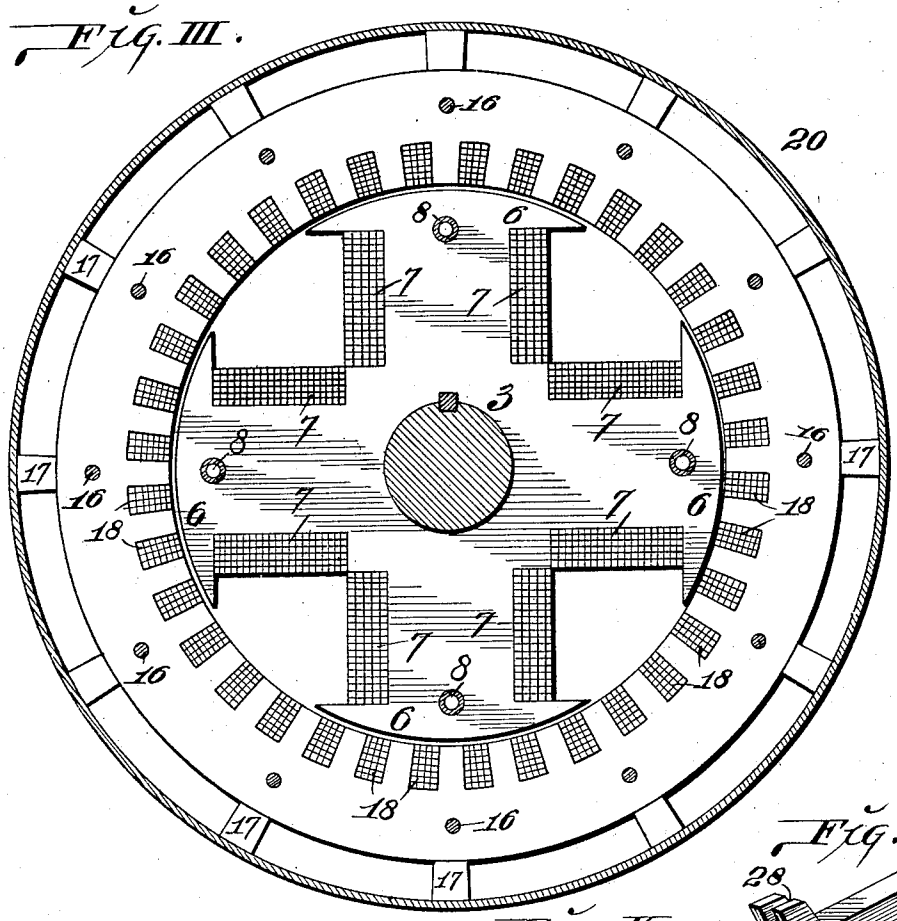


FIG. VI.

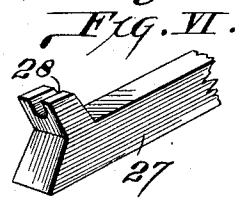


FIG. V.

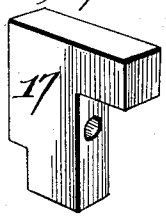


FIG. IV.

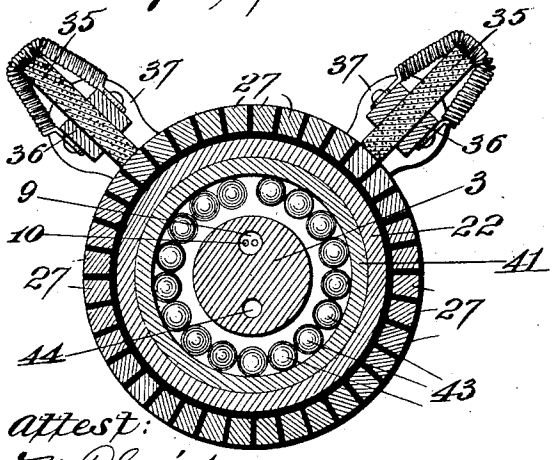
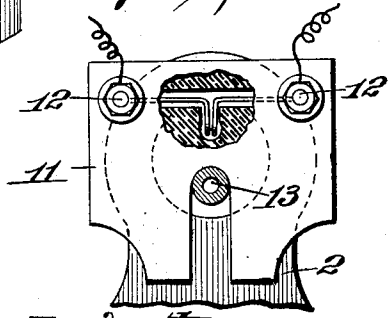


FIG. VII.



attest:

W. L. Smith

E. S. Knight

Inventor:

Harry Lindenberger

By Wright Bro atty's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 737,253. Patented August 25, 1903.

UNITED STATES PATENT OFFICE.

HARRY LINDENBERGER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO DIAMOND ELECTRIC MACHINERY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 737,253, dated August 25, 1903.

Application filed July 26, 1902. Serial No. 117,101. (No model.)

To all whom it may concern:

Be it known that I, HARRY LINDENBERGER, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Electric 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 an electric motor, the object of the invention being to produce a motor possessing superior features of construction and adaptability and which without a change of parts other than the addition of a greater or less number of plates that go to make up the bodies of the field and armature may be made of a desired horse-power within reasonable limits.

My invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a perspective view of my improved motor. Fig. II is a longitudinal vertical section. Fig. III is a vertical transverse section taken on line III III, Fig. II. Fig. IV is an enlarged vertical section through the commutator and brushes of the motor, this section being taken on line IV IV, Fig. II. Fig. V is a perspective view of one of the arms of the armature. Fig. VI is a perspective view of one of the sections of the commutator. Fig. VII is a detail end view.

Referring to the drawings, 1 represents the base or bed-plate of the machine and which is provided with vertical standards 2, that support a fixed shaft 3, the shaft being held from turning by means of set-screws 4 or otherwise.

5 is the field-piece of the motor. It is rigidly secured or mounted on the shaft 3, being held from turning thereon by being keyed or otherwise fastened thereto. The body of the field is made of thin metallic plates, each made in the form of a cross, as seen in Fig. III, the outer ends of the arms of the plates being formed with heads 6, inside of which the arms as a whole are wound with wire 7. The plates are held together by means of hollow bolts or rivets 8, through which air can circulate, the tendency of which would be to keep the field cool. The shaft 3 is provided with an aperture 9, through which extend the ends 10 of the wires of the field, the ends of the wires terminating at a plate 11 of non-conducting material, where they are made fast to the binding-posts 12. The plate 11 is connected or made fast to the shaft 3 by means of a hollow screw 13, which may be provided with a cap 14.

15 represents the armature of the machine, which is made up of thin metallic plates bound together by means of bolts 16, passing therethrough and through arms 17, one of the arms being shown in Fig. V. Any desired number of these arms and bolts are arranged around the armature, a sufficient number being used to hold the metallic plates firmly together. The inner faces or edges of the plates forming the body of the armature are notched, as shown in Fig. III, to receive the winding-wires 18. As these wires are arranged on the interior of the armature, no binding-wires are required, inasmuch as the centrifugal force when the armature is running tends to throw the wires outwardly away from the shaft 3, in which direction they are unable to move because they are held in notches that are formed in the inner surface of the plates that go to make up the body of the armature. The spider of the armature is made up of side plates 19, a peripheral band 20, and hubs 21 22. The plates 19 are connected to the arms 17 by means of bolts or screws 23, and these plates have circular openings to receive the inner ends 24 of the hubs 21 and 22, the hubs having flanges 25 outside of the plates and to which the plates are connected by bolts or screws 26. The hubs thus go to make up part of the spider and form part of the housing or casing that incloses the field 5. The hub 21 forms the driving-pulley of the machine, while the hub 22 is utilized to receive and hold the commutator-sections 27, one of which is shown in detail in Fig. VI. These sections 27 are formed with notched projections 28, that receive the ends 29 of the armature-wires, as shown in Fig. II, these ends extending out through the side plate 19, which is perforated and provided with non-conductive bushings through which the ends of the wires pass. The sections 27 are set in recesses in the hub

22. They are insulated therefrom, as shown in Fig. II, and held thereon by means of a washer 31 and a nut 32.

33 is a guard-collar secured to the plate 19 and which serves to cover the ends 29 of the armature-wires and the inner ends of the commutator-sections.

35 represents the commutator-brushes that are supported in arms 36, extending inwardly from projections 37 on a collar 38, secured to the stationary shaft 3 by means of a set-screw 39. The outer ends of the arms 36 act as binding-posts for the line-wires 40.

Inside of the hubs 21 and 22 are bushings 41, between which and sleeves 42 are located antifriction-balls 43. The sleeves 42, having beveled edges, are rigidly secured against turning on the shaft 3, but adapted to slide thereon, so that the balls form the journal-bearing between the hubs of the spider of the armature and the stationary shaft. If preferred, a close fit may be made between the bushings 41 and the sleeves 42 and the ball-bearing dispensed with, in which event the bearing can be oiled through openings 44, formed in the shaft 3, and which are closed by the cap 14 at the commutator end of the machine and a similar cap 14^a at the other end of the machine.

45 represents washers located on the shaft 3 between the outer ends of the hubs of the spider and the standards 2 of the bed-plate, and by increasing or diminishing the number of these washers or the size of them the shaft may be provided with larger or smaller fields and armatures, and it will thus be seen that without any change of parts except the use of more or less plates that go to make up the bodies of the armature and field motors of different horse-power may be produced, while utilizing all of the other parts of the machine. Further, when the sleeves 42 and the bushings 41 become worn by tightening the nut 45^a all wear can be taken up, the sleeves 42 being forced closer together.

The inner part of the plate 19, that is adjacent to the hub 21, is provided with perforations 46, and the rim 20 is provided with perforations 47, these perforations providing for a circulation of air through the machine while it is running for the purpose of keeping the parts cool.

I claim as my invention—

1. In an electric motor, the combination of a shaft, field-magnets rigidly secured to the shaft, and an armature surrounding the field-magnets and having a spider formed with side plates and hubs to which the side plates are secured; one of the hubs acting as a pulley and the other as a support for the commutator-sections, substantially as set forth.

2. In an electric motor, the combination of a shaft, field-magnets rigidly secured to the shaft, and an armature surrounding the field-magnets; said armature having arms bolted thereto and side pieces bolted to the arms and to hubs mounted on the shaft, substantially as set forth.

3. In an electric motor, the combination of a shaft, field-magnets mounted on the shaft, an armature inclosing the field-magnets; said armature consisting of plates, arms bolted to the plates, a band surrounding the arms, side plates bolted to said arms, and hubs to which said side plates are bolted; said hubs, side plates and band serving as the housing of the armature, substantially as set forth.

4. In an electric motor, the combination of a shaft, field-magnets mounted on the shaft, and an armature inclosing the field-magnets, said armature having a perforated peripheral band and perforated side pieces, substantially as set forth.

5. An electric motor, consisting of a shaft, field-magnets mounted on the shaft and consisting of plates secured together by hollow bolts, and an armature surrounding the field-magnets and having a perforated peripheral band and perforated side plates, substantially as set forth.

6. An electric motor consisting of a shaft, field-magnets mounted on the shaft, and an armature surrounding the field-magnets, said armature having side plates and hubs to which the side plates are connected, one of said hubs forming the support for the commutator-sections, and said sections having notched projections to receive the ends of the armature-wire, substantially as set forth.

HARRY LINDENBERGER.

In presence of—
E. S. KNIGHT,
M. P. SMITH.