(No Model.)

2 Sheets—Sheet 1.

O. F. CONKLIN.

ELECTRIC FAN.

No. 596,483. Patented Jan. 4, 1898.

Fig. 2.

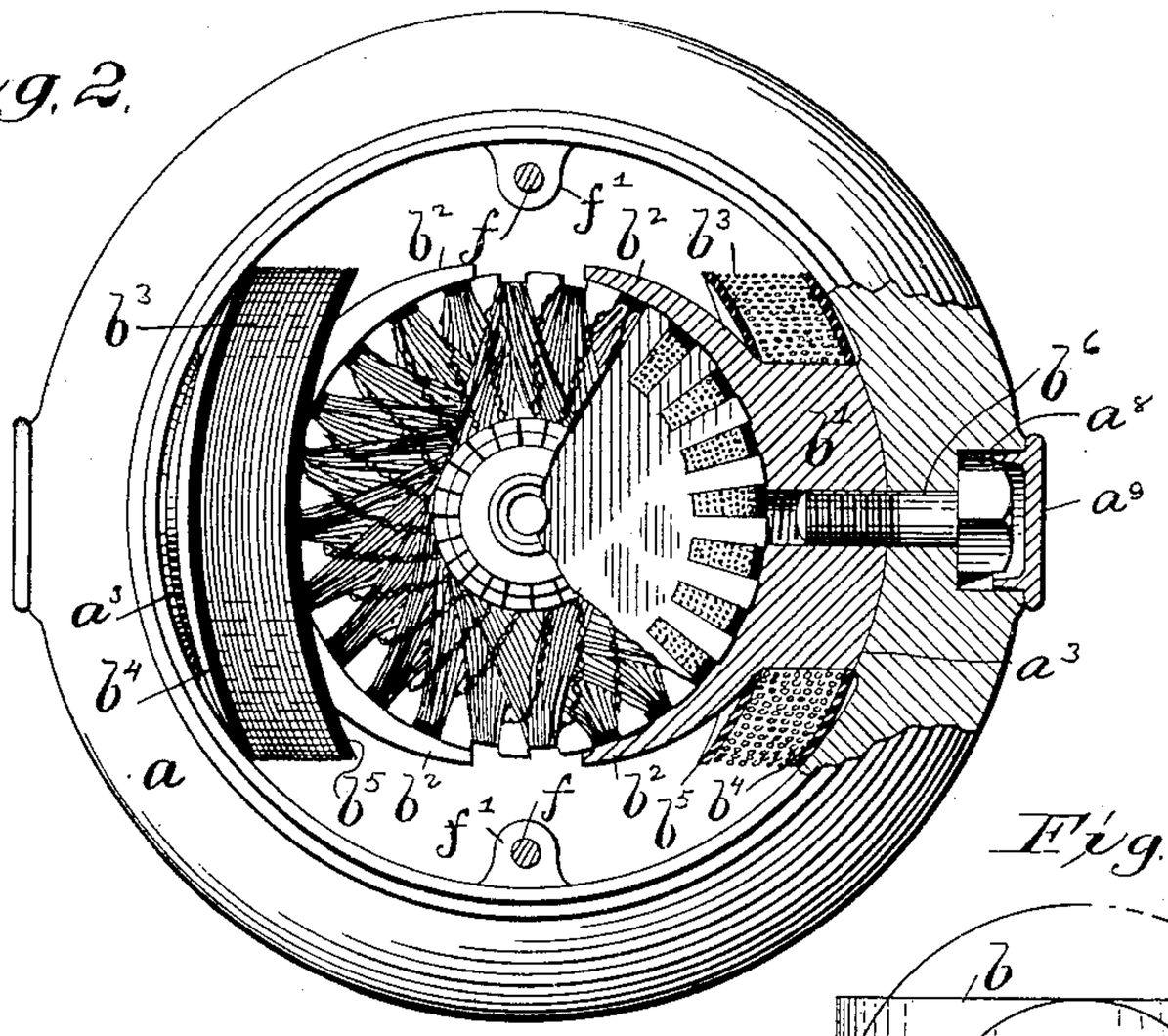


Fig. 3.

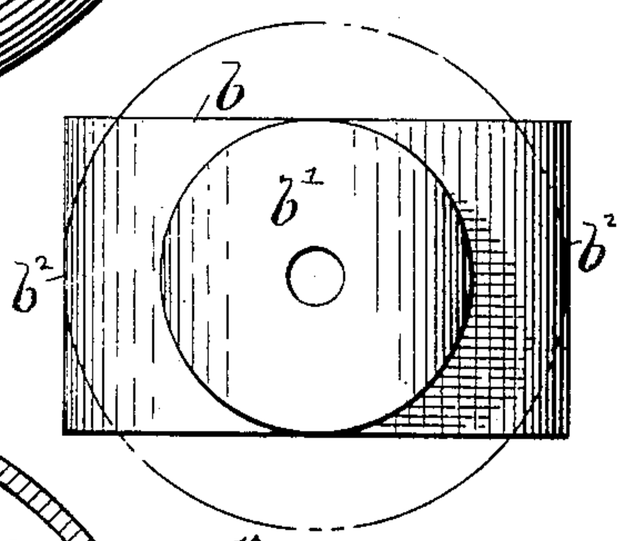
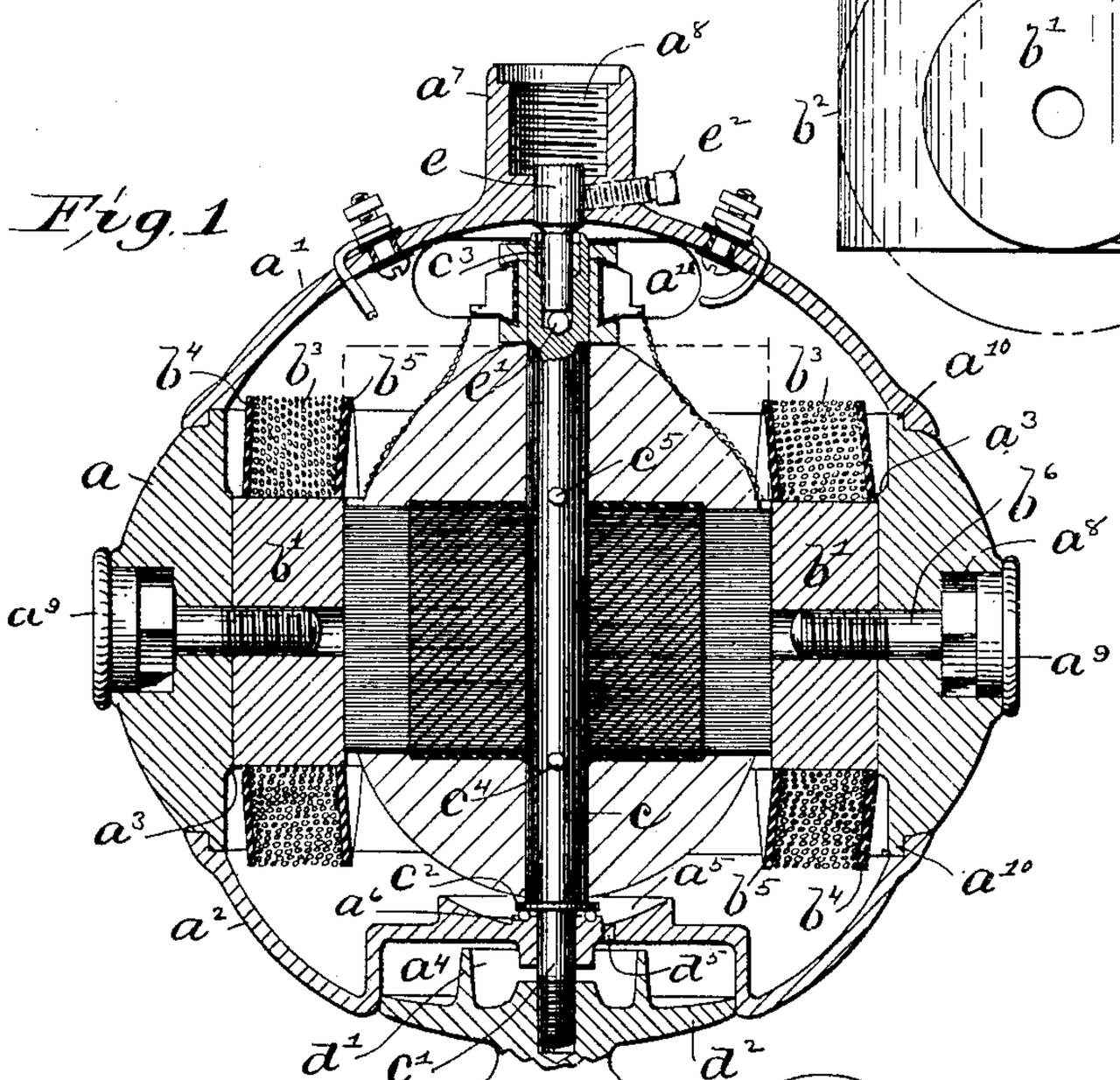


Fig. 1.



Witnesses
G. McGridley
Chas. I. Welch

Inventor
Oliver F. Conklin
By his Attorney
Carl A. Otis

(No Model.)

2 Sheets—Sheet 2.

O. F. CONKLIN.

ELECTRIC FAN.

No. 596,483. Patented Jan. 4, 1898.

Fig. 4

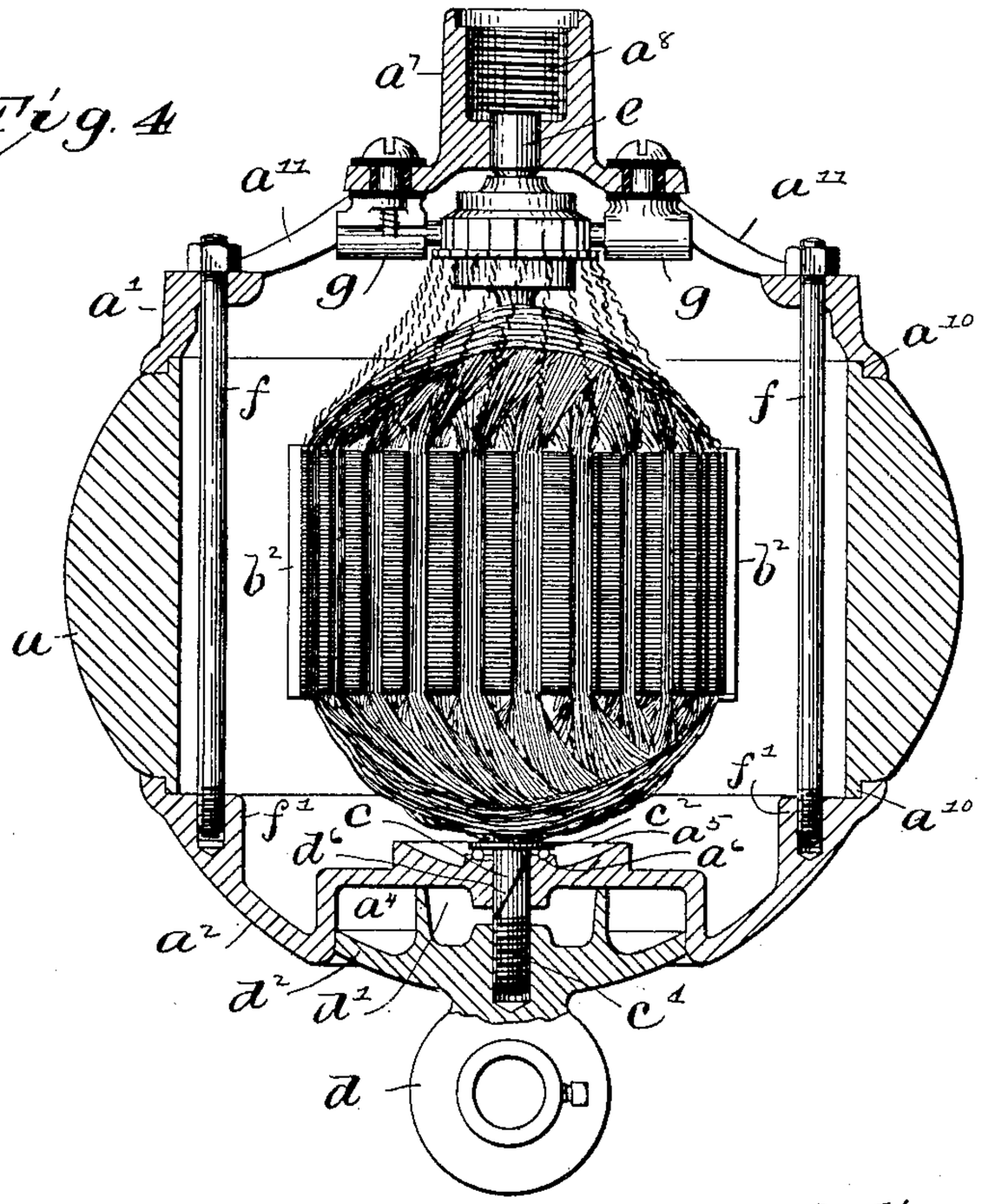


Fig. 6.

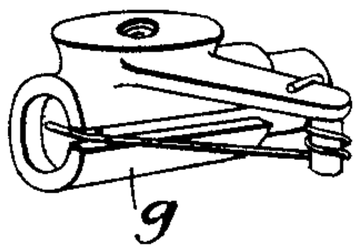
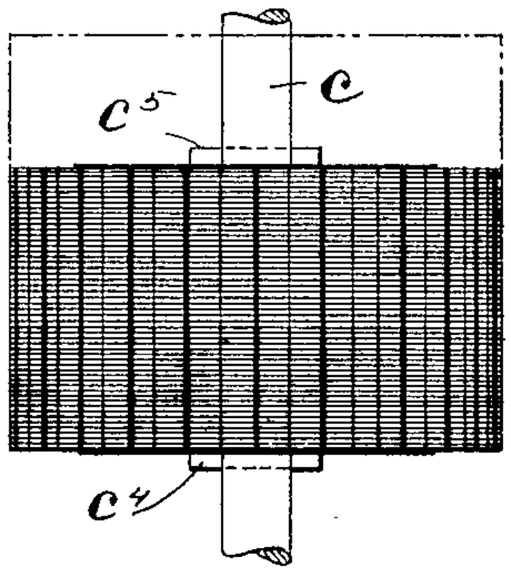


Fig. 5



Witnesses
G. M. Gridley
Chas. F. Webb

Inventor
Oliver F. Conklin
By his Attorney
Paul A. Staats

UNITED STATES PATENT OFFICE.

OLIVER F. CONKLIN, OF SPRINGFIELD, OHIO.

ELECTRIC FAN.

SPECIFICATION forming part of Letters Patent No. 596,483, dated January 4, 1898.

Application filed June 17, 1897. Serial No. 641,114. (No model.)

To all whom it may concern:

Be it known that I, OLIVER F. CONKLIN, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Electric Fans, of which the following is a specification.

My invention relates to improvements in electric fans or electric-fan motors; and it relates particularly to that class of motor-fans which are adapted to be suspended from the ceiling or from other convenient points of attachment.

The object of my invention is to provide in a motor-fan of this character improved constructions which will enable me to produce an efficient motor which shall be cheaply constructed and which will be embodied within small compass, the parts being so arranged as to be easily accessible for cleaning or repairs. I attain this object by the constructions shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation of a device embodying my invention. Fig. 2 is a partial plan view of the same with a part of the casing removed and a part shown in section. Fig. 3 is a detail view of one of the field-magnets. Fig. 4 is a sectional elevation taken at right angles to Fig. 1. Fig. 5 is a detail view showing the manner of constructing the armature. Fig. 6 is a detail view in perspective of a brush-holder.

Like parts are represented by similar letters of reference in the several views.

In constructing my improved motor I preferably employ an outer casing which is formed of three parts—a central portion a and end caps a' and a^2. The central portion a is formed in the nature of a heavy metallic ring and constitutes the support and the magnetic connection for the field-magnets b b. This ring or central support a is preferably of a plain cylindrical form on its interior, except that on opposite sides there are constructed projecting bosses or bearing-seats a^3, which project slightly into the interior of the ring. These bosses are formed concave on their outer extremities, or, in other words, their extremities are turned off concentric with the ring, so as to form a concave bearing-face.

The field-magnets b b proper are each constructed with a raised portion b' and projecting ends b^3, which extend outwardly, so as to partially surround the armature. The end of the magnet or magnetic core which joins the boss a^3 is formed convex and is seated in the concave bearing formed in the end of said boss. The line of division between the supporting-ring a and the field-magnet core, or, more properly speaking, the magnetic connection between the parts, is thus formed on the arc of a circle and of a greater area than if the division-line or magnetic connection was at right angles to the core, and as the magnetic resistance varies with the area of the contacting surfaces I thus attain less resistance by having the connection on the arc of a circle and am thus enabled to use a core of smaller cross-section.

In forming the field-magnets and mounting them within the casing I employ coils b^3, which are properly insulated and are provided with flexible insulating-washers b^4 b^5 at the respective ends of the coils. In assembling the parts these coils are slipped over the waist portion b' of the cores and the parts then joined together by bolts b^6, which extend through the outer ring a and are screwed into the cores b'. As the parts are drawn together the coils b^3, being flexible, will be forced to assume a curved position between the projection b^2 of the magnetic core and the curved interior surface of the supporting ring or cylinder by a deflection of the plane of the coil. By this construction I am enabled to form the field-magnets within small compass and with a small quantity of wire, thus decreasing the cost of construction and increasing the efficiency.

In constructing the armature I take a shaft c. This shaft is preferably reduced at one end, as shown at c', to form a shoulder, against which I place a collar c^2, which fits the reduced portion. The lower end c' of the shaft is screw-threaded, as shown, and the fan-carrying head d is secured directly thereto. The shaft c is preferably bored out at its upper end and counterbored for a shorter distance, as shown at c^3. The armature proper is built up of a series of disks, of sheet metal, each of which is notched to receive the coils which

constitute the winding of the armature. These disks are preferably formed by stamping and are mounted one upon the other upon the shaft *c*. The disks thus placed one upon the other will embody a certain amount of resiliency, owing to the irregularities in their shape, which distinguish them from perfectly plain surfaces. I have found in practice that disks which have not been straightened can be compressed longitudinally on the shaft to occupy a much more compact position than when placed loosely thereon and that the natural resilience of the metal in thus compressing and straightening the disks is sufficient to hold them in a compact form, and I employ this natural elasticity or resilience in forming the armature by compressing said disks between two contacting projections c^4 and c^5 on the armature-shaft, said contacting projections consisting, preferably, of pins driven through the shaft, so as to hold the disks firmly bound together. In Fig. 5 I have indicated in dotted lines the position or space occupied by the disks before being compressed and the disks after being compressed in full lines. This method of forming the armature or armature-core I have found to result in a very efficient and economical construction, the windings of the armature being performed in the usual manner.

In one of the end caps a^2, which would in a suspended fan be the bottom, I construct a recess a^4, adapted to receive a projecting cup d', formed on the fan-carrying head, the head being further provided with a laterally-projecting flange d^2, which surrounds said cup and which closes the recess a^4 in the bottom of the casing. Within the casing and also formed in the end cap a^2 is a cup-shaped depression a^5, which surrounds the bearing for the armature-shaft *c*, which is formed in the end cap or cover a^2. Within this depression and surrounding the bearing proper for the armature-shaft I place a ball-race a^6 and have located therein a series of balls which rest when in the proper position in contact with the collar c^2, so as to thus support the weight of the armature on the balls, while the lateral strain on the armature-shaft is held by the straight bearing formed in the end cover a^2. Adjacent to the cup or receptacle a^5 is a perforation d^5, which is arranged above the cup d' and permits the escape of the oil from the receptacle a^5 to the cup d', the construction being such that the oil will by the revolving armature be carried up from the cup d' through the journal-bearing and ball-bearing and escape into the receptacle a^5 and back again into the opening d^5.

At the opposite end of the armature-shaft I employ a plug *e*, which is fitted in an opening extending through the end cap or cover a' and is turned down to fit into the bore in the end of the armature-shaft *c*. Between this plug and the inner end of the bore of the shaft I place a single ball e', the bottom of the bore in said shaft and the end of the plug being slightly countersunk to form contacting surfaces for said ball, which will center the same when the parts are moved together. The lower end of the plug *e* is fitted to the small portion of the bore in the shaft, thus leaving the counterbored portion c^3 to form an oil-receiving cup. To provide for adjusting the plug *e* and securing the same in different positions, I preferably employ a set-screw e^2, which extends through the cap or cover a', so as to contact with said plug. This cap or cover a' is also further provided with a neck or boss a^7, which is counterbored and screw-threaded, as shown at a^8, to receive a suitable support to which the casing may be attached for suspending it to a ceiling or any other convenient support.

From the construction described it will be seen that by loosening the set-screw e^2 and pressing down on the plug *e* when the parts are in a vertical position, as shown in Figs. 1 and 4, the plug *e* may be pressed firmly down onto the ball e', and thus take up all longitudinal motion of armature. The plug *e* is formed with straight bearings where it passes through the cap a' and where it fits into the armature-shaft, and these bearings, as well as the bearings for the armature-shaft in the other end cap or cover a^2, are fitted snugly, so as to prevent any lateral motion of the shaft. As the motor, however, is constructed to operate with the armature in a vertical position, the entire weight is carried by the ball-bearings, while the armature is held firmly against lateral movement by the parallel bearings.

The central supporting-ring *a* is preferably counterbored, as shown at a^8, on each side to receive the bolts b^6, and small caps or covers a^9 are inserted into said counterbored portions to cover said bolts and form a finish to the outer casing.

The central support or ring *a* and the end caps or covers are secured together and the whole united into one substantial frame or casing by clamping-bolts *f*, which extend through suitable perforations in one of said end pieces and are preferably screw-threaded into the opposite end piece, small lugs or bosses f' being preferably provided for this purpose. The parts—that is to say, the respective end caps and the central ring—are provided with interengaging projections, as shown at a^{10}—that is, one of the parts is provided with a projecting flange which fits over a corresponding flange or projection on the other part. The parts are thus securely held together and are all entirely supported from the upper cap portion a' and from the central neck or projection a^7. The upper cap portion a' is preferably cut out, as shown at a^{11}, to form openings opposite the brush-holders *g*, which are secured to said cap or cover. These brush-holders may be of any suitable construction, but are preferably arranged so that they stand opposite the openings a^{11}, which thus afford easy access thereto for adjustment

or otherwise and also permit ready access to the commutator for any purpose desired.

It will be seen from the above description that I provide a motor that can be formed into small compass which at the same time has a high rate of efficiency. The cup d' on the rotating fan support or head is adapted to receive oil and retain the same therein. I preferably construct the journal which rests in the bearing immediately above this cup with a small angularly-arranged groove d^6, which by the rotation of the shaft causes the oil to be carried from the cup d' up through the bearing and to the ball-bearing immediately above the same. The counterbore c^3 also furnishes a convenient receptacle for the oil at the upper end of the armature-shaft.

Having thus described my invention, I claim—

1. The combination with the outer casing or ring formed cylindrical on the inside, an armature-shaft extending through said casing or ring and having bearings therefor, field-magnets within said ring or casing and having core-pieces enlarged at one end and curved to conform to said armature and connected by a central neck or waist to the cylindrical casing at the other end the field-magnet coils being formed on said central neck or waist portions and held in place by the enlarged portion of the cores and curved to conform to the space between the curved portions of the pole-pieces and the inner periphery of the supporting-ring substantially as specified.

2. An armature having a core consisting of a series of disks compressed on a shaft without any separating or insulating material between the same so as to form a substantially solid metallic body, the disks being held together and on said shaft by means of engaging projections and by the resiliency of said disks, substantially as specified.

3. The combination with the outer casing, the armature-shaft, a fan-supporting head secured to said shaft, a cup in said head, a bearing in said casing for said shaft adjacent to said cup, and a ball-bearing also in said casing, an oil-receptacle adjacent to said ball-bearing, and a perforation from said oil-receptacle leading into said cup, and means for carrying the oil from said cup into said bearing substantially as specified.

4. The combination with the outer casing having the end caps as described, an armature-shaft mounted in said casing, said armature-shaft having a parallel bearing at one end in one of said caps and journaled on an adjustable pin or projection in the other cap, a shoulder or collar on said shaft having ball-bearings in one end of said cap, and a single ball between said pin or projection and said armature-shaft at the other end, substantially as specified.

5. The combination with the outer casing having the armature-shaft therein, a journaled bearing for said shaft in one end of said casing, said shaft being bored out and adapted to receive a projecting journal adjustable in said casing at the other end, a ball within the bore of said shaft and between the bottom of said bore and said projecting journal, and a ball-bearing around said shaft adjacent to the parallel journal in said casing, substantially as specified.

6. The combination with the outer casing, the armature-shaft, and a fan-supporting head secured to said shaft, a cup in said head, a bearing in said casing for said shaft adjacent to said cup, an inclined slotted oilway in said bearing extending into said cup, an oil-receptacle within the casing adjacent to the top of said bearing, and a perforation from said oil-receptacle leading into said cup, substantially as specified.

In testimony whereof I have hereunto set my hand this 10th day of June, A. D. 1897.

OLIVER F. CONKLIN.

Witnesses:
CHAS. I. WELCH,
G. M. GRIDLEY.