No. 636,087. Patented Oct. 31, 1899.

G. A. TOWER.

ELECTRIC MOTOR FOR FANS.

(Application filed July 20, 1899.)

(No Model.)

Fig. 1.

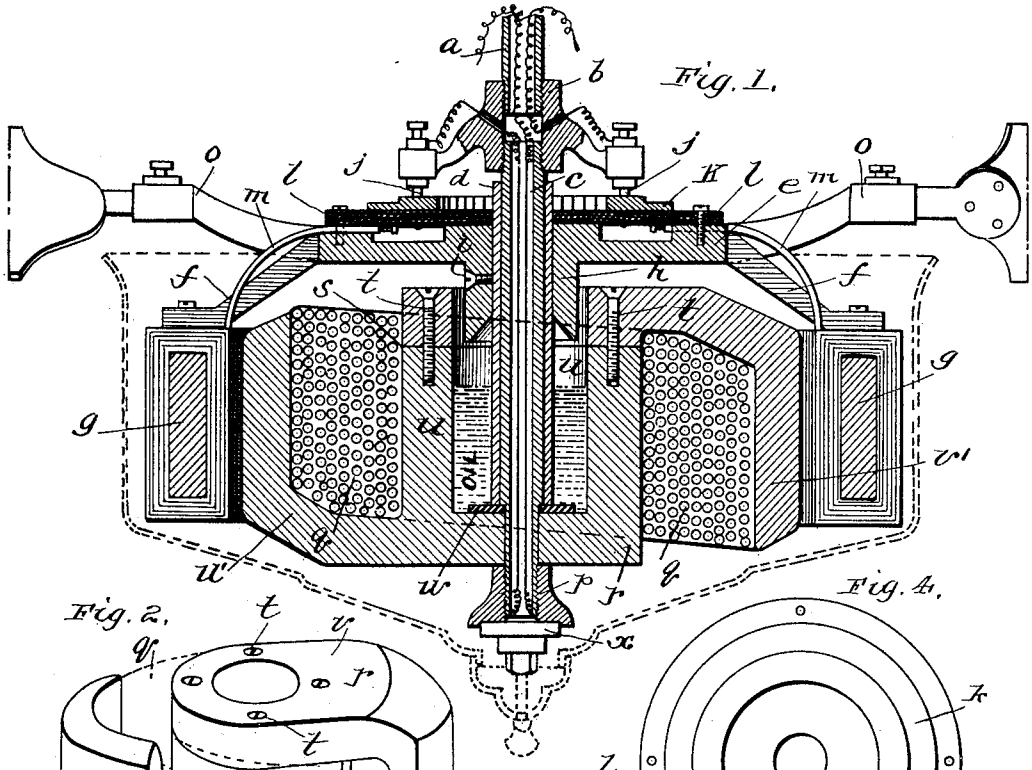


Fig. 2.

Fig. 3.

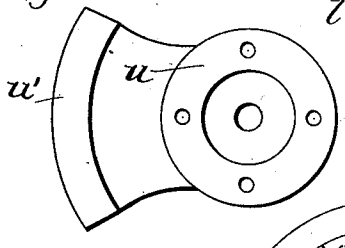


Fig. 4.

Fig. 5.

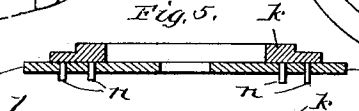


Fig. 6.

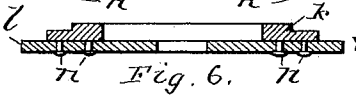


Fig. 8.

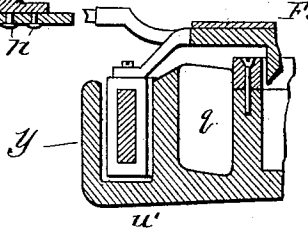


Fig. 7.

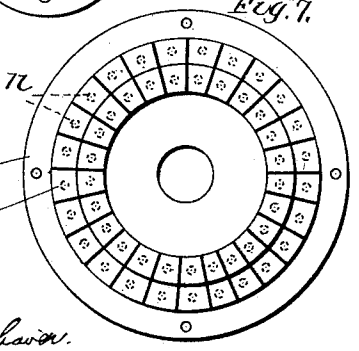
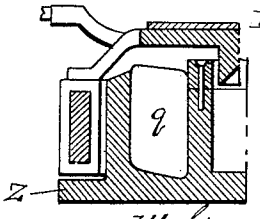


Fig. 9.



Witnesses
Geo. M. Copenhaver.
F. G. Chapman

Inventor,
George A. Tower,
By Davis & Davis,
Attorneys

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

UNITED STATES PATENT OFFICE.

GEORGE A. TOWER, OF RICHMOND, VIRGINIA, ASSIGNOR TO THE TOWER-BINFORD ELECTRIC AND MANUFACTURING COMPANY, OF SAME PLACE.

ELECTRIC MOTOR FOR FANS.

SPECIFICATION forming part of Letters Patent No. 636,087, dated October 31, 1899.

Application filed July 20, 1899. Serial No. 724,523. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. TOWER, a citizen of the United States, residing at Richmond, county of Henrico, State of Virginia, have invented certain new and useful Improvements in Electric Motors for Fans, &c., of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of the motor; Fig. 2, a detail perspective of the field-magnet, the coil being removed; Fig. 3, a plan in detail of one of the field-magnet sections; Figs. 4, 5, 6, and 7, detail views of the commutator in various stages of completion, and Figs. 8 and 9 detail sections showing slight modifications of the field-magnet poles.

The object of the invention is to provide a simple, compact, and efficient motor especially adapted for cooling-fans of the class employing horizontal fan-blades and suspended from the ceiling, special provision being made for thorough lubrication and for detaching or separating the various parts for ready examination and repair, as more fully hereinafter set forth.

In the drawings, *a* designates the vertical suspending-tube, having attached to its lower end by a screw-coupling *b* an extension *c*, which forms the bearing for the sleeve-shaft *d* of the horizontal armature-carrier *e*, this carrier being provided with a series of radial arms *f*, to the outer ends of which is secured the depending ring armature *g*. The hub *h* of the carrier *e* fits the tubular shaft *d* and is removably secured thereto by a set-screw *i*, this set-screw permitting vertical adjustment of the carrier on the shaft and the shaft extending up through the carrier to near the coupling *b* in order that the bearing of the shaft on the supporting-tube will be coextensive with the length of the shaft, this extensive bearing-surface contributing to stability and economy in wear.

The coupling *b* carries radial arms, attached to which are the commutator-brushes *j*, which bear upon the upper faces of a circular series of commutator-sections *k*, fastened to an insulating-plate *l*, which latter is fastened down upon the upper face of the carrier *e*. The sections of the commutator are connected, as usual, by wires *m* to the respective sections of the rotating armature, the ends of these wires passing in between the plate *l* and the carrier *e* and connected to one or both the attaching-rivets *n* of the sections. The armature-carrier also carries a series of radial arms *o*, provided with the usual sockets for the fan-blades.

The stationary field-magnet is clamped to the lower end of central tube *c* by a nut *p*, being thereby inclosed within the armature and being readily removable independently of the same. It consists of a single coil *q* and two metal castings *r*, secured removably together on the horizontal line *s* by vertical screws *t*. The lower section consists of a vertical cylindrical cup *u*, having an opening in its bottom for the passage of the supporting-tube *c* and having its upper end open, an arm or projection *u'* being formed integral with this cup at one side of its lower end, this arm extending horizontally outward and upward, terminating about on a level with the upper edge of the armature, the upward-turned portion of said arm being curved horizontally to conform to the curvature of the armature and field-coil and the coil lying between this upturned portion and the cup or central part. The other section of the field-magnet consists of an open ring *v*, fastened down upon the upper end of the cylindrical part *u* by means of said screws *t* and having formed integral with it an arm *v'*, extending radially outward in the opposite direction from the arm *u'* and then downward, terminating about on the level of the lower edge of the coil, the depending part being curved to conform to the curvature of the armature and field-coil. The field-coil surrounds the central cylindrical part and is partly surrounded itself by the curved portions of arms *u'* and *v'*, whereby said curved parts of the arms are made to form the pole-pieces as well as to serve to support and confine the field-coil. It will be observed that the open cylindrical part of the neutral metal of the field-magnet is thereby utilized to form an oil-cup of considerable capacity, which is a valuable feature in suspended motors. It will also be observed that the lower end of the tubular shaft *d* extends into the oil-cup, preferably resting upon a

fiber washer, which in turn rests upon the bottom of the cup, whereby the shaft will be constantly lubricated. The hub *h* of the carrier preferably depends into the oil-cup a short distance and has its lower edge beveled downward and outward, so that any oil that may creep up the outer surface of the shaft will be caused to drip back again into the cup or be thrown against the side wall thereof.

The conducting-wires are passed down the suspending-tube *a* and *c* to the switch *x*, secured to the lower end of the tube below the nut *t*, the wires to the commutator-brushes passing out through openings in the coupling *b*.

The method of manufacturing the commutator is as follows: A ring with its upper face carefully planed is first fastened to the insulating-plate *l* by means of rivets *n*, formed integral with the ring, a pair of these rivets being provided for each section of the armature. When these rivets are all headed, the ring is sawed through radially to the surface of the insulating-plate between each radial pair of rivets, thus insulating all the sections from each other by preserving their true circular alinement. This method of making the commutator is very simple and results in an exceedingly accurate device.

To fill the spaces between the sections *k* of the commutator, I drive therein sheets of insulating material *x*, such as mica soaked in shellac, thereby excluding grease and dirt from said spaces.

It will be observed that the essential feature lies in the peculiar manner of forming the field-magnets. This construction not only enables a vertical oil-cup to be formed directly in the body of the magnet, where it will be out of the way, as well as in position to receive the lower end of the armature-shaft and constantly and automatically lubricate the same, but will also permit the use of a sufficiently long bearing for the armature-shaft to properly steady the fans without increasing the depth or vertical thickness of the motor to an undue extent. This horizontal compactness is obviously very desirable in suspended fans, it being a feature constantly sought for by makers of electric fans. To further diminish the vertical diameter of the apparatus, the field-coil is inclined to the axis of the armature; but to this feature I lay no claim, as it is old in the art.

It is obvious that this motor may be used for driving other devices than fans and also that it may be used as a generator. It will be understood also that the oil-cup would be equally effective if it were brought down lower by extending the lower casting downward; but since it adds to the compactness of the machine to locate it in the position shown I prefer it in that position. It will be further obvious that the pole-pieces *u'* and *v'* may be extended so as to surround or partly surround the armature-coil, as shown at *z* in Fig. 9, where it extends outward under the lower side of the coil, or at *y* in Fig. 8, where it embraces not only the under side, but extends up upon the outside of the coil. This, it is thought, will increase the effectiveness of the motor without materially increasing its size or weight.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A vertical support, a stationary field-magnet attached thereto and having its upper side recessed to form an oil-cup around said support, said support extending downward into the oil-cup, an armature-carrier carrying an armature and a tubular shaft, this shaft embracing said central support and extending down into the oil-cup.

2. In combination with a central support, a field-magnet having a central oil-cup formed in its upper side, around said central support, a tubular shaft surrounding said central support and extending into the oil-cup, an armature-carrier secured to said tubular shaft above the oil-cup and provided with a hub depending into the oil-cup, said hub being adapted to stop the upflowing oil and throw it against the sides of the cup, an armature, and commutator devices.

3. In combination with a central support, a field-magnet having a central oil-cup formed in its upper side, around said central support, a tubular shaft surrounding said central support and extending into the oil-cup, an armature-carrier secured to said tubular shaft above the oil-cup and provided with a hub depending into the oil-cup, said hub having its lower end beveled downward and outward, an armature, and commutator devices.

4. In an electric motor, the combination of a central support, carrying commutator-brushes, a stationary field-magnet having an oil-cup formed in the upper side of its body portion around the central support, said magnet being provided with a horizontal coil surrounding said cup portion, said cup portion being provided with radial arms carrying pole-pieces, a plate carrying a commutator and a ring armature, the latter surrounding the field-magnet, a tubular shaft carrying said plate and surrounding the central support and depending into the oil-cup.

5. In an electric motor or generator, the combination of a support, a ring armature, a commutator and a field-magnet having an oil-cup formed in its upper side and pole-pieces extended to embrace two or more sides of the ring armature, as and for the purposes set forth.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 13th day of July, 1899.

GEORGE A. TOWER.

Witnesses:
R. B. BOWE,
T. T. HARRIS.