(No Model.) 3 Sheets—Sheet 1.

F. H. BEERS.

ELECTRIC MOTOR.

No. 492,524. Patented Feb. 28, 1893.

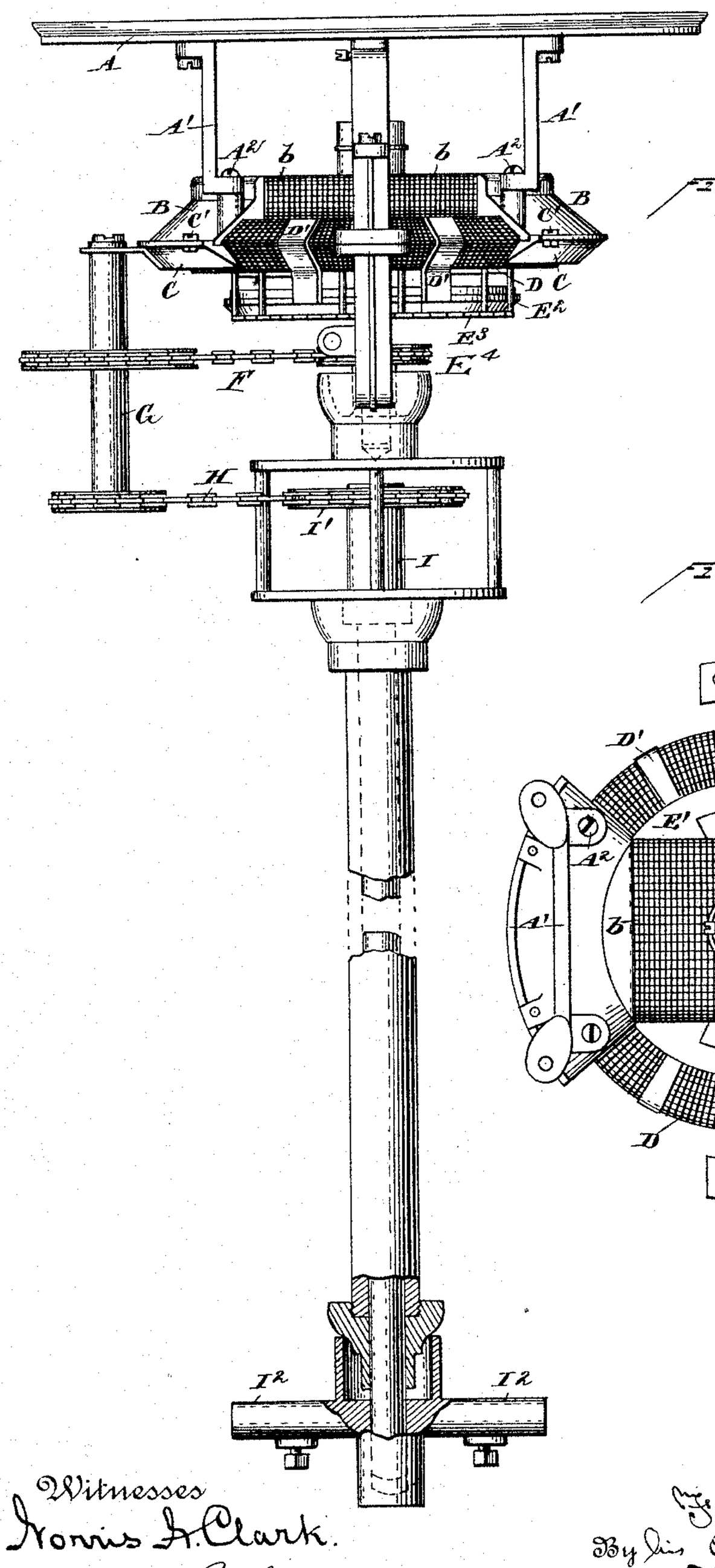
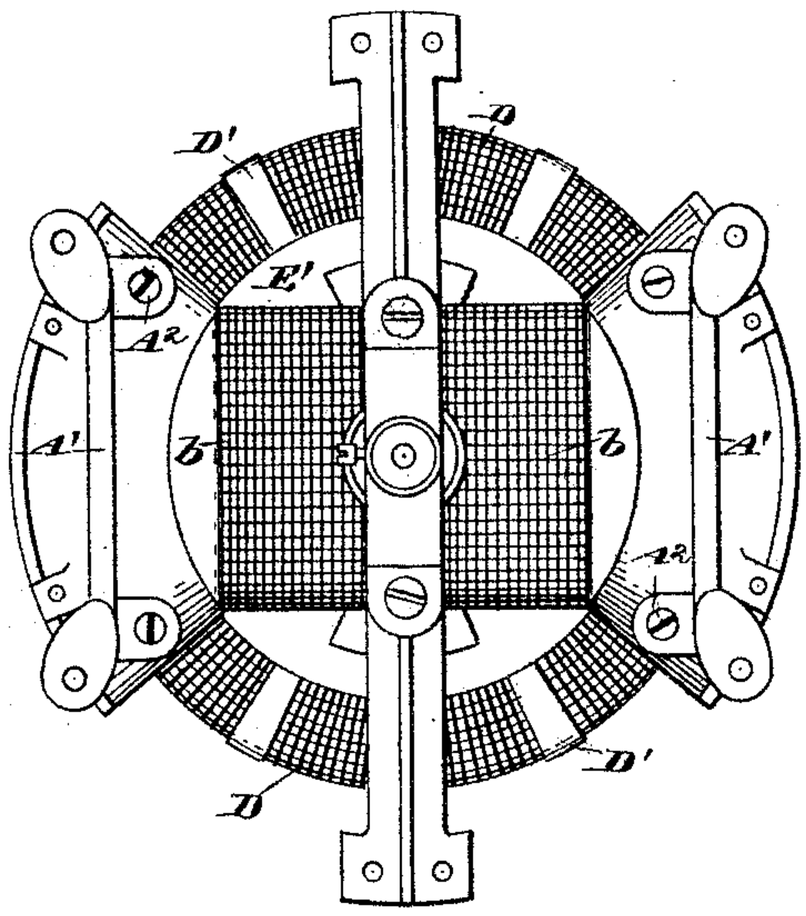


Fig. 1.

Fig. 5.



Witnesses
Norris H. Clark.
Charles K. Searle.

Inventor
Franklin H. Beers
By his Attorney
Thomas Ewing Sexton

(No Model.) 3 Sheets—Sheet 2.

F. H. BEERS.

ELECTRIC MOTOR.

No. 492,524. Patented Feb. 28, 1893.

Fig. 2.

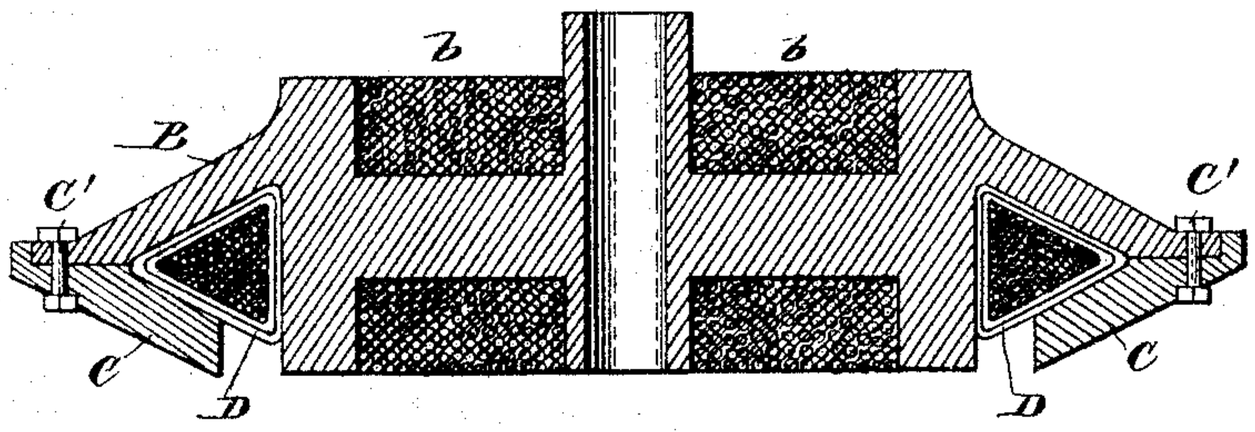


Fig. 3.

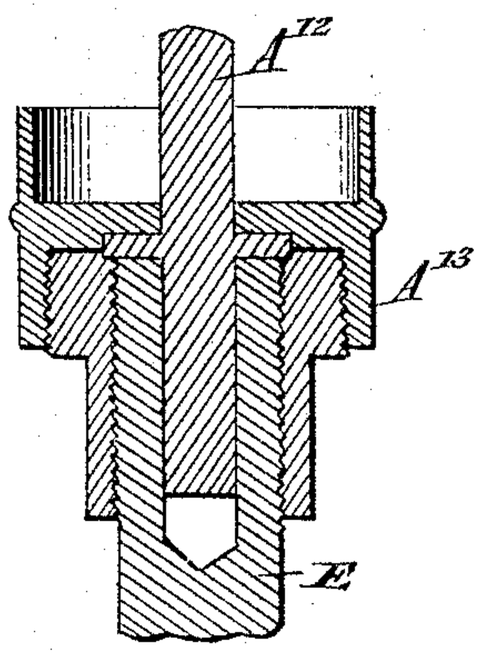
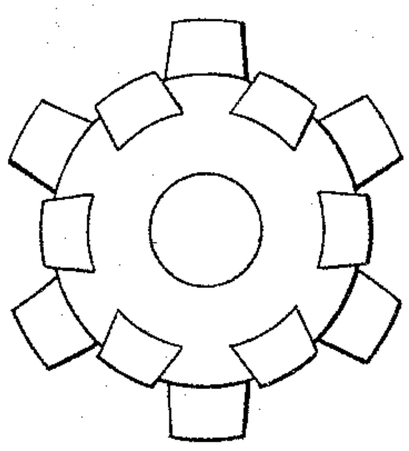


Fig. 4.



Witnesses
Morris A. Clark.
Charles R. Searle.

Inventor
Franklin H. Beers
By his Attorney
Thomas Dyer Stetson

(No Model.) 3 Sheets—Sheet 3.

F. H. BEERS.

ELECTRIC MOTOR.

No. 492,524. Patented Feb. 28, 1893.

Fig: 6

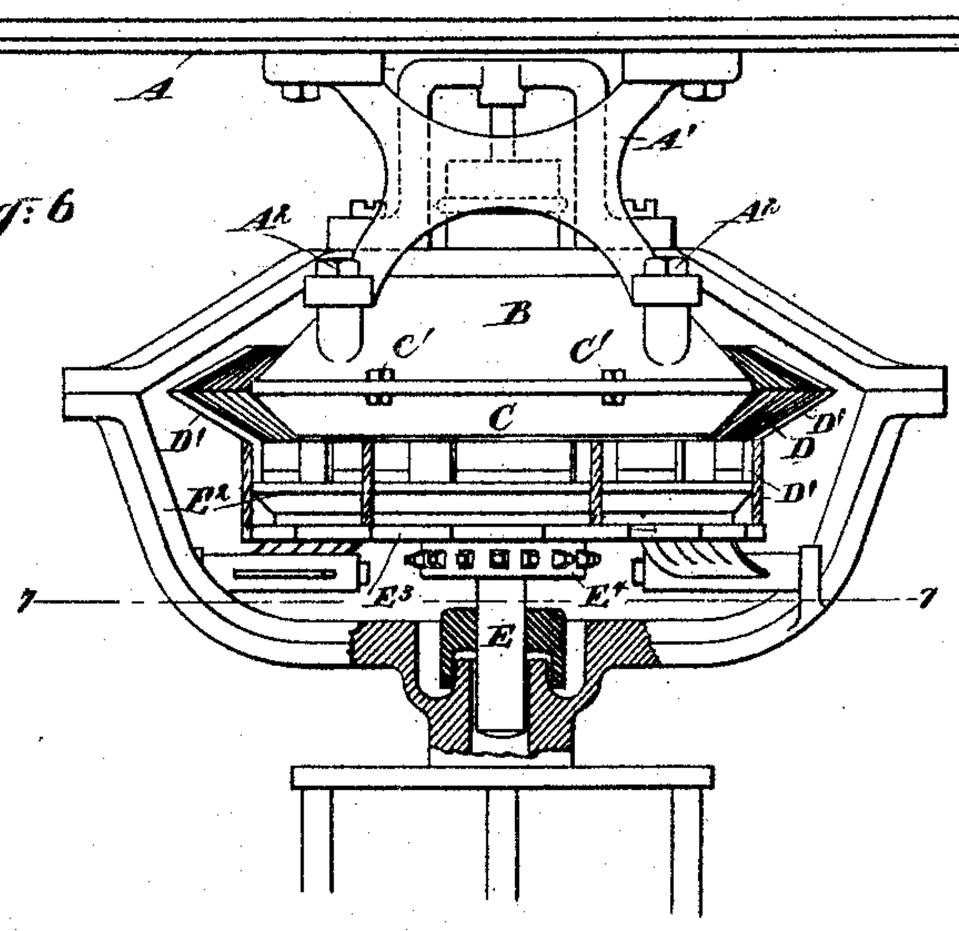
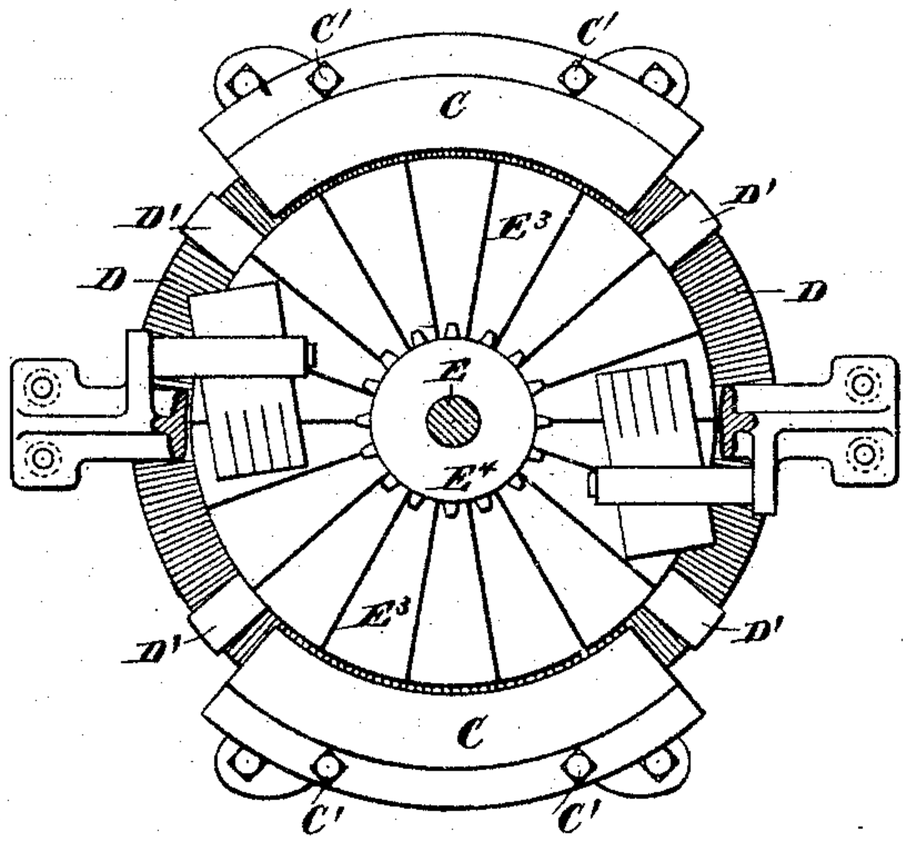


Fig: 7.



Witnesses:
Charles R. Searle,
H. A. Johnstone.

Inventor:
Franklin H. Beers
by his attorney
Thomas Ayres Stetson

UNITED STATES PATENT OFFICE.

FRANKLIN H. BEERS, OF NEWARK, NEW JERSEY.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 492,524, dated February 28, 1893.

Application filed April 2, 1892. Serial No. 427,559. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN H. BEERS, a citizen of the United States, residing at Newark, Essex county, in the State of New Jersey, have invented a certain new and useful Improvement in Electric Motors, of which the following is a specification.

The invention is adapted more especially to serve in offices, work-shops, dwellings, restaurants, and generally in any situations where it is desired to agitate the air. I operate horizontally revolving fans each by an independent electric motor. The motor revolves rapidly in a horizontal plane on a shaft distinct from the fan-shaft, and connected thereto by mechanism which increases the force, reducing, of course, the velocity. I employ an unusually efficient fan-driving mechanism which may be located in any position, independent of any other fan, and be changed in position at will, correspondingly changing the position of the connecting wires. The construction allows great facility for slowing or stopping the fan, or varying the velocity of each fan independently of that of any other fan or fans. I attain the required connection between the motor and the fan by means of pitch-chains running silently on sprocket wheels having the proper relations of size, and peculiarly faced with leather. I carry the weight of the fan-shaft by a bearing at the upper end, and support it laterally by a bearing at the bottom, both having provisions for efficient lubrication. The core of the armature is of triangular cross-section, giving marked advantages in the construction. The armature works within a closely matched casting serving as the field magnet, which nearly incloses it and has an annular opening extending around below, through which arms carried on a spider-frame below reach up and support the armature. The under face of the spider-frame carries radially arranged commutator-plates acting against brushes which are supported on fixed lugs. The commutators and the brushes, as also the field-magnet and the armature coils, are properly connected to a dynamo or other source of strong electric current in any ordinary or suitable manner.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation, a portion being broken away to reduce the length. The remaining figures show details on a larger scale. Fig. 2 is a central vertical section through the field magnet and armature. Fig. 3 is a central vertical section through the bearing at the top of the motor which supports its weight and keeps it in position. Fig. 4 is on a smaller scale. It represents one of the sprocket wheels. Fig. 5 is a plan view with the top plate removed. Fig. 6 is a side elevation partly in vertical section, and Fig. 7 is a horizontal section on the line 7—7 in Fig. 6 seen from below.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is a horizontal plate bolted to the ceiling and forming in effect a part thereof.

A′, A′, are rigid arms extending downward from A, to which is firmly fixed by screws A^2 a casting B, to which in turn are secured by bolts and nuts C′ two partial rings C, C, which with the casting B serve as a field magnet. The general form of section of the casting B and partial rings C is shown in Fig. 2. In rectangular channels around the body of the casting B are wound the field magnet coils *b*.

In an annular space of triangular cross-section within the field magnet B, C, is mounted an armature D, of corresponding triangular section, but sufficiently smaller to allow it to revolve without contact. A series of arms D′ connect this armature to a ring E^2 at a slightly lower level, which latter is the periphery of a spider-frame E′ fixed on the central upright shaft E, peculiarly supported, as will presently appear. The electric current, acting through ordinary connections or commutators E^3 carried under the spider and ring, induces a rapid rotation of the armature D, and consequently of the arms D′, ring E^2, spider E′ and shaft E. The soft iron wires of the armature core are wound in layers, having in each layer one less turn than in the layer preceding, until they terminate in a single turn, thus forming the core strictly triangular in cross-section. The coils wound thereon are

divided into sections, insulated and connected up in the usual manner. The arms D′ are formed of separate pieces of metal firmly embracing the core between certain of the sections of coil, and extending downward as already described, connecting this armature stiffly to the spider-frame E′ below. There are the ordinary provisions by commutators and brushes for closing and opening the circuit through the coils at the proper times to attain the rapid rotation of the armature and consequently of the shaft E. The upper pitch-chain F by means of its sprocket-wheel E^4 communicates this motion to the sleeve G reduced in velocity, and the lower pitch-chain H communicates motion again to the shaft I, further reduced in velocity but increased in force. This gives a proper speed and force for the fans which are attached adjustably to the arms I^2.

The bearing shown in Fig. 3 is formed by a stationary rod A^{12} extending down from the ceiling, provided with a sufficiently broad collar A^{13} and inclosed in a box formed on the upper end of the rapidly rotating shaft E by adding screw-threaded parts as shown. The uppermost has a considerable cavity on its upper side.

I can provide one or more pulleys on the shaft I below the sprocket-wheel I′ and connect by round belts or other suitable means from the shaft I to another, not shown, but I propose under all ordinary conditions to avoid such connection and work each fan independently by its own motor, with the advantage that it may be shifted into any position and may be connected and disconnected at any moment by simply switching the current on or off. The independent action of each also gives great facility for modifying the velocity of each according to the conditions required. Thus in a large hall or other room there may be a number of my fans, part of which are working with their full force, others standing idle and others working under various intermediate conditions.

When one fan is out of use it may stand still instead of annoying the eye by rotating idly. This is of special importance in hospitals where patients may be peculiarly sensitive to annoyance from such cause.

There may be a tight casing, not shown, inclosing the motor and the counter-shaft, and such may be made ornamental in appearance, and may serve usefully in defending the bearings and oil-cups against dust.

My provision in this independently operated fan and its motor for reducing the speed and increasing the force is important by allowing the fan to be worked at a proper effective velocity by a very moderate current. My experiments indicate that I can run thus independently any number of five-foot fans by the current required for a corresponding number of incandescent lamps.

I do not in this application claim the improved mechanism for operating the fan by means of this motor, such being made the subject of a separate application for patent, filed October 24, 1891, Serial No. 409,675.

I claim as my invention—

1. In an electric motor, a revolving armature having a core of triangular cross-section made with each layer containing one less wire than the layer preceding, in combination with wires wound thereon constituting an armature of triangular cross-section with rounded angles, and with a field magnet B, C, matching closely thereto with a sufficient annular opening to allow the armature to be mechanically connected to its shaft, as herein specified.

2. In an electric motor having a revolving armature D, the field magnet B, C, matching closely to such armature and nearly embracing it in cross-section, in combination therewith, and with arms D′ traversing in a sufficient annular opening and connecting it with a spider E′ and with commutator-bars and connections, as herein specified.

3. The revolving armature D, of triangular cross-section, field magnet B, C, having cavities adapted to match closely to such armature, and connections from the armature through a sufficient annular opening to a spider-frame or supporting wheel E′, which also carries the commutator-bars E^3, all arranged for joint operation as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

FRANKLIN H. BEERS.

Witnesses:

CHARLES R. SEARLE,

JOSE L. FINGLETON.