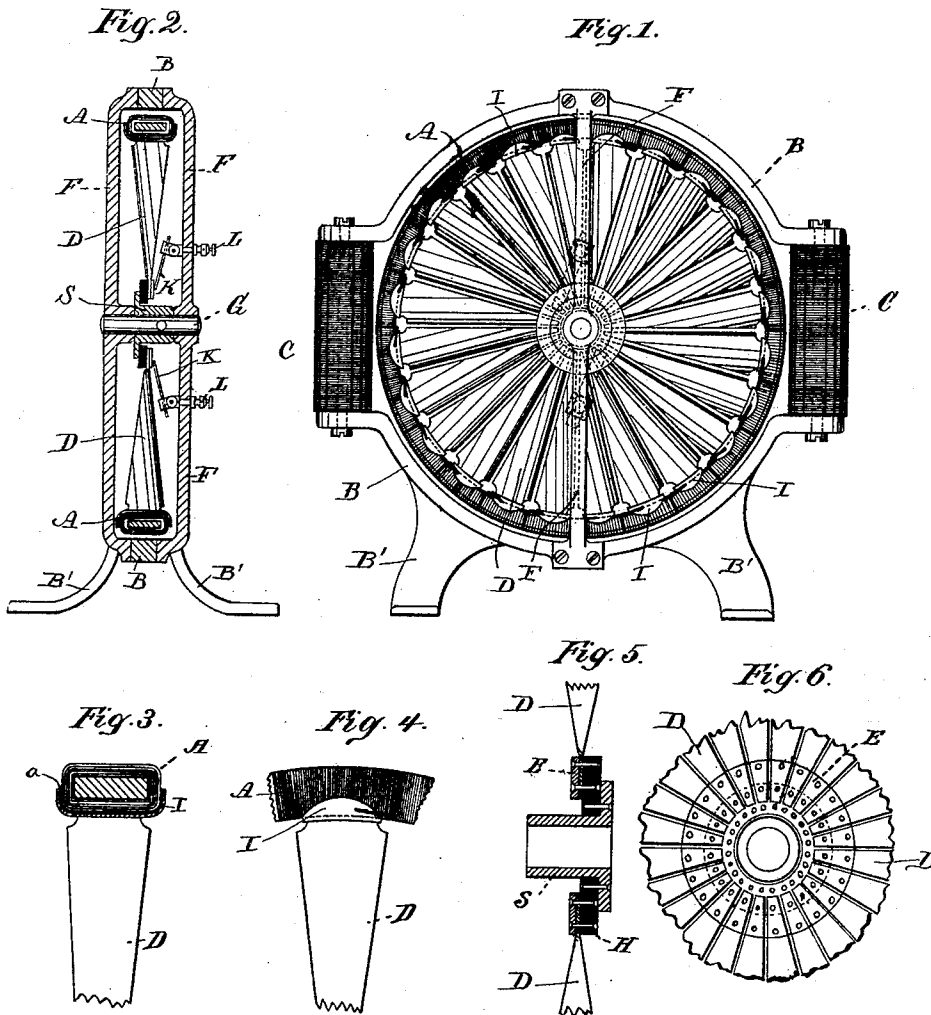


P. DIEHL.  
ELECTRIC FAN.

No. 550,042.

Patented Nov. 19, 1895.



WITNESSES:

Channing Whitaker.  
Arthur G. Cushman.

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Fig. 8.

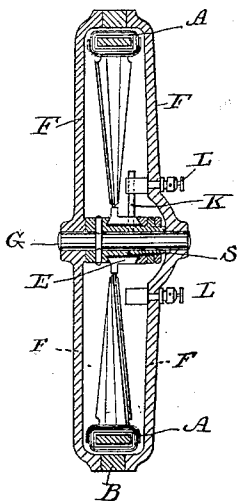


Fig. 7.

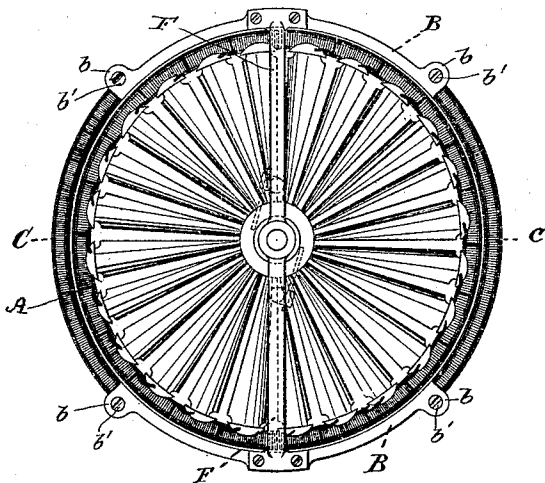


Fig. 10.

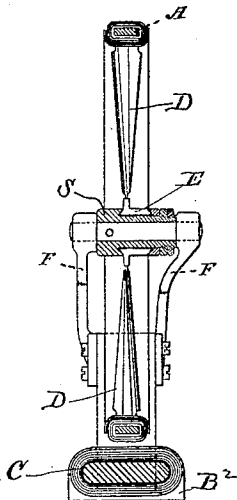
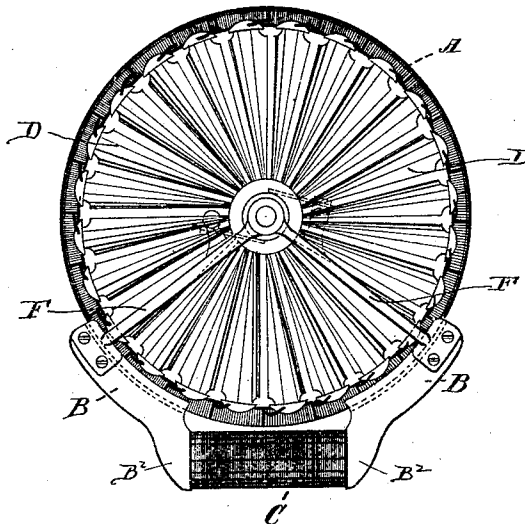


Fig. 9.



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# UNITED STATES PATENT OFFICE.

PHILIP DIEHL, OF ELIZABETH, NEW JERSEY.

## ELECTRIC FAN.

SPECIFICATION forming part of Letters Patent No. 550,042, dated November 19, 1895.

Application filed May 11, 1891. Serial No. 392,384. (No model.)

*To all whom it may concern:*

Be it known that I, PHILIP DIEHL, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electrical Fans, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has for its object to provide an electrical fan of compact and simple construction in which the fan-blades are arranged inside of a rotating ring-armature, with the field-magnet located outside of the armature. The commutator is formed at the hub or central portion of the fan, and the fan-blades or wings are preferably utilized as conductors between the commutator-sections and the armature, and in thus utilizing the fan-blades as conductors they are insulated from each other and the armature-ring is wound in sections corresponding in number to the number of the fan-blades, said blades being of course electrically connected with the commutator and armature sections, all as will be hereinafter more fully described.

In the drawings, Figure 1 is a side view of one form of my improved fan. Fig. 2 is a central sectional view of the same; and Figs. 3, 4, 5, and 6 are detail views of portions thereof on a larger scale. Figs. 7 and 8 are side and sectional views, respectively, of another form of my invention; and Figs. 9 and 10 are also side and sectional views, respectively, of still another form of my invention.

A denotes a ring-armature, which may be either of the Gramme or Pacinotti type, and B B are the pole-pieces of electro field-magnets C, the latter being either straight, as in Figs. 1 and 9, or curved to correspond to the armature, as in Fig. 7. Where two magnets are employed, as in Figs. 1 and 7, they, together with their pole-pieces, entirely inclose or encircle the ring-armature, and thus form a guard therefor.

D denotes the fan blades or wings connected at their inner ends to the hub S of the armature-wheel and at their outer ends to the ring-armature A, said blades being preferably of metal and serving as spokes for the armature-wheel. These fan-blades are

preferably insulated from each other and utilized as conductors between the commutator E and the ring-armature, and in such case the ring-armature is wound in sections corresponding in number to the number of the fan-blades, each blade being electrically connected at its outer end to its armature-section and having conductively attached to its inner end a section of the commutator E.

Figs. 5 and 6 show in detail a convenient construction of the inner portion of the armature-wheel, H denoting a ring or disk of vulcanized fiber or other insulating material riveted to a flange on the hub S of the armature-wheel, and to this insulating ring or disk the fan-blades and armature-sections, in electrical contact with each other, are both riveted.

To hold the outer ends of the fan-blades firmly in place and to prevent injury to the winding of the armature-sections, I prefer to provide said ends with supporting pieces or shoes I, between which and said sections insulating material *a* may be interposed, as denoted in Fig. 3, and in such case said shoes may be electrically connected with said sections by suitable conductors, as denoted in Figs. 1, 4, 7, and 8. By thus insulating the shoes from the armature-sections leakage of the current is avoided; but when low-tension currents are to be employed the shoes may be omitted and the outer ends of the fan blades or wings may be soldered or otherwise directly attached to the armature-sections.

The pole-pieces B of the field-magnet are connected together by supports or bridges F, which serve, also, as bearings for the shaft G of the armature-wheel, as shown more clearly in the sectional views, Figs. 2, 8, and 10; but instead of having bridges on both sides of the wheel to form bearings for said shaft, the hollow hub S of said wheel might rotate on a stud supported by bridge-pieces on one side only of the wheel, as will be readily understood. The brushes K are supported by holders attached to the bridges F, said holders being connected to or forming a part of the binding-posts L.

The commutator, instead of being of the flat form shown in Figs. 2, 5, and 6, may be of the more common cylindrical form shown

in Figs. 8 and 10, the sections of this form of commutator being insulated from the hub of the armature-wheel, as denoted.

To enable my improved fans to stand on tables or other suitable horizontal supports, the pole-pieces B may have suitable legs or feet B', as in Figs. 1 and 2, or suitable flat bases B<sup>2</sup>, as in Fig. 10, or to enable the fan to be secured in a window or against a wall or other vertical support the pole-pieces may have ears or projections b for the reception of attaching-screws b', or the fans may be suspended by a hook from a ceiling.

In all the different forms of my invention shown it will be observed that the fan-blades are inclosed and protected by the encircling armature-rings and that when the armature-rings are encircled or inclosed by the field-magnets and their pole-pieces, as shown in Figs. 1, 2, 7, and 8, the armature-wheels and their fan-blades are fully protected and guarded, peripherally, so that persons will not be liable to accidental injury by coming in contact therewith; but, if desired, a few wires or suitable bars may be extended across from one pole-piece to the other to form an open-work casing to inclose and fully protect the fan.

From the foregoing it will be apparent that my improved fan is adapted to serve as a compact and convenient air propelling or forcing device, which is suitable for a large variety of purposes, as for cooling and ventilating houses and rooms, for ventilating sewers, for creating artificial drafts in chimneys, or for use in other places where fans or blowers may be desired.

While I prefer to utilize the metallic fan-blades as conductors between the commutator-sections and the armature, I do not wish to be understood as limiting my invention thereto, as this electrical connection may be effected wholly or partly by independent wires or conductors provided for the purpose.

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

1. In an electrical fan, an armature wheel consisting of a central hub, a series of metallic blades or wings serving as the spokes of said wheel and forming part of the electrical circuit, and a ring armature outside of and supported by the said blades or wings, combined with a field magnet located outside of the said armature wheel and so constructed that with its pole pieces it entirely surrounds the said wheel peripherally, thereby inclosing and guarding the same.

2. In an electrical fan, the combination with an encircling armature, of a series of metallic fan blades or wings within the same

and insulated from each other, and a field magnet outside of said armature, the latter being wound in sections corresponding in number to the number of said blades or wings which are separately electrically connected at their outer ends to said sections.

3. In an electrical fan, the combination with a ring armature, of a series of metallic fan blades or wings inclosed within the same, and a field magnet which, with its pole pieces, entirely surrounds said armature, peripherally the said pole pieces, or one of them, being constructed to serve as supports for the fan.

4. In an electrical fan, an armature wheel consisting of a central hub, a series of metallic blades or wings serving as the spokes of said wheel, and a ring armature outside of and supported by said blades or wings, combined with a field magnet located outside of said armature ring.

5. In an electrical fan, an armature wheel consisting of a central hub, provided with a ring or disk of insulating material, metallic fan blades attached to said ring or disk at their inner ends, and a ring armature to which the outer ends of said blades are attached.

6. In an electrical fan, an armature wheel consisting of a central hub, provided with a ring or disk of insulating material, fan blades attached to said ring or disk at their inner ends, and a ring armature to which the outer ends of said blades are attached, said armature being wound in sections corresponding in number to the number of said blades, and the latter being separately electrically connected at their outer ends to said sections.

7. In an electrical fan, the combination with an armature wheel consisting of a central hub, a series of fan blades or wings serving as spokes for said wheel, and a ring armature encircling said blades or wings, of a field magnet outside of said armature, and bridges connecting the poles of said magnet and serving as supports for said wheel.

8. In an electrical fan, the combination with an armature wheel consisting of a central hub provided with a shaft to form journals, a series of fan blades or wings serving as spokes for said wheel, and a ring armature encircling said blades or wings, of a field magnet outside of said armature, and bridges on both sides of said wheel connecting the poles of said magnet and serving as bearings or supports for the journals of said wheel.

In testimony whereof I affix my signature in presence of two witnesses.

PHILIP DIEHL.

Witnesses:

W. H. RYAN,

IRA B. WHEELER.