No. 684,459. Patented Oct. 15, 1901.

E. F. PORTER.

ELECTRIC HEATER.

(Application filed Jan. 29, 1898.)

(No Model.)

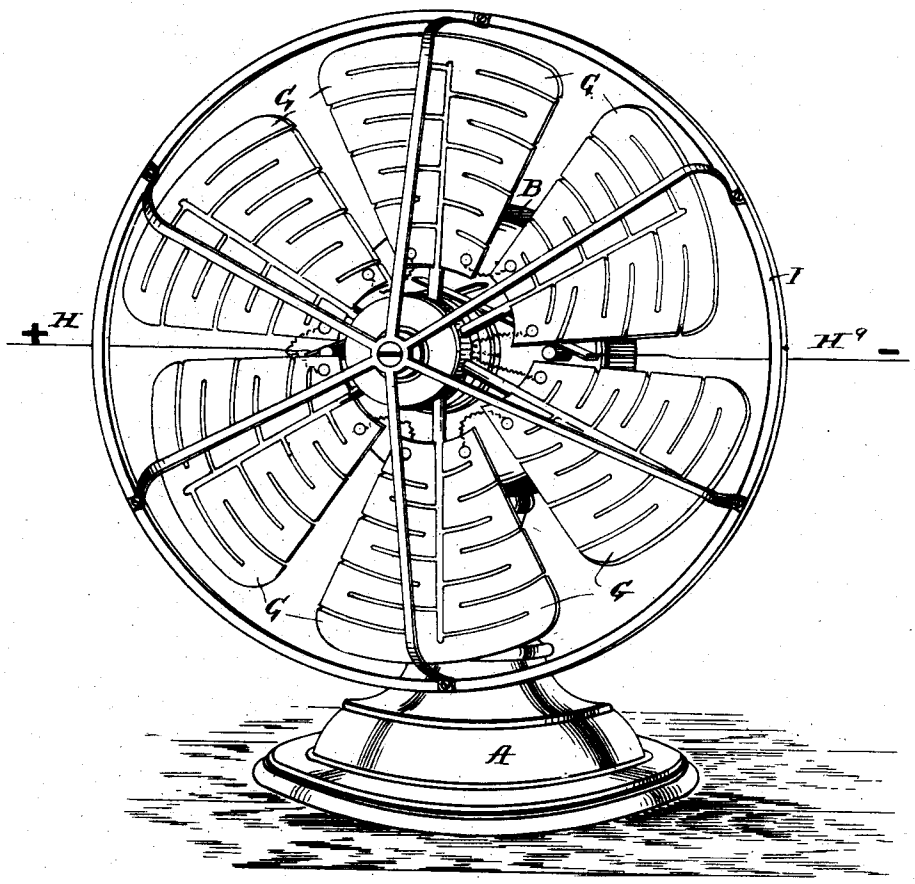


Fig. 1.

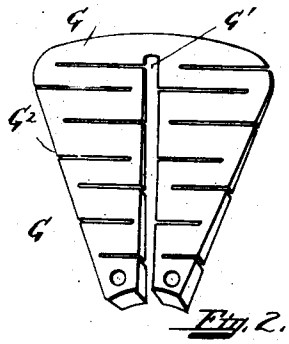


Fig. 2.

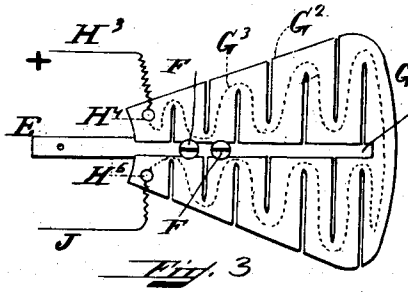


Fig. 3.

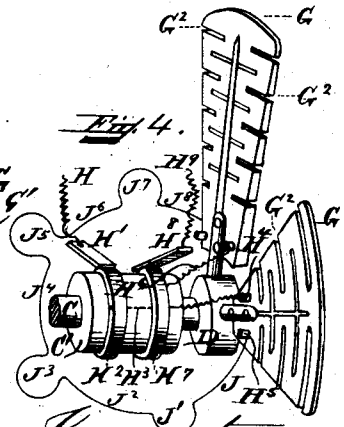


Fig. 4.

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UNITED STATES PATENT OFFICE.

EDWIN F. PORTER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE BAY STATE ELECTRIC HEAT & LIGHT COMPANY, OF JERSEY CITY, NEW JERSEY.

ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 684,459, dated October 15, 1901.

Application filed January 29, 1898. Serial No. 668,403. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. PORTER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

My invention relates to improvements in electric heaters, and especially to that class of electric heaters known as "electric-fan heaters," described and claimed in the United States patent issued to Mark W. Dewey, No. 449,404, dated March 31, 1891.

The object of my invention is to electrically heat the blade of a fan without adding thereto or mounting thereon any resistance material, the blade being itself heated directly by a current passing through it. Heretofore electric-fan heaters have been constructed by mounting the electrical heating resistances on the blade of the fan, the blade being either solid or in skeleton. This form is disadvantageous, because of the complication of parts necessary for its construction, whereas in the form which I adopt absolute simplicity is attained, as a material, such as carbon, is used for the blade which has the required mechanical strength for moving the air and also the requisite electrical qualities to form a heating resistance. This construction as compared to previous constructions is simpler, cheaper, and more compact, as there is but one part—namely, the blade—which both agitates the air and heats the air.

My invention consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate a construction embodying my invention, Figure 1 is a perspective view of an electric-fan heater embodying my invention. Fig. 2 is a perspective view of one of the blades. Fig. 3 is a plan view of one of the blades. Fig. 4 is a detail perspective view showing the manner of arranging the blades in series, two blades being shown to illustrate the circuit entering and leaving.

Like letters of reference refer to like parts throughout the several views.

A represents a support, upon which is mounted a suitable electric motor B, on the shaft C of which is mounted the hub D. Secured to said hub are a series of arms E, of insulating material, and by means of suitable screws F, also of insulating material, each blade G is securely fastened to its arm E. The blade G is molded of carbon in an integral mass or may be made of other material which has, like carbon, sufficient mechanical strength to resist the pressure of the air in its revolution and which also offers sufficient resistance to the current to become heated during its passage. The resistance of the blade is increased by partially dividing it in the center by a longitudinal division G′, which gives a greater length of material for the current to pass through, and because of the necessary increase in width of the fan-blade toward its outer end the blade is decreased in thickness (see Fig. 2) proportionately to its increase in width for the purpose of equalizing the resistance throughout the entire length of the blade, which resistance would decrease as the blade becomes wider if the thickness of the blade were uniform throughout. By thus varying the thickness of the blade to correspond with the varying width thereof the blade is uniformly heated throughout. The resistance of the blade may be still further increased by a number of transverse divisions G^2, which will give a still greater length of material for the current to travel without increasing the area of the blade. By this construction a blade of a smaller area will offer a greater resistance to the passage of the current than a blade of the same area of the ordinary construction—that is, without the divisions. These transverse divisions may be utilized for the purpose of equalizing the resistance throughout a blade of uniform thickness and gradually-increasing width by making them more numerous or closer together as they approach the outer and wider end of the blade. The current enters through the wire H to the brush H′ to the collector-ring H^2, mounted on the insulating-drum C′, and then by the wire H^3 to the binding-post H^4, and, the current traversing the blade, as indicated in Fig. 3, to the binding-post H^5, out through the wire J (see Fig. 4) to the blade represented by the loop J′, and then by the wire J^2 to the blade represented by the loop J^3, and then by the wire J^4 to the blade represented by

the loop J^5, and then by the wire J^6 to the blade represented by the loop J^7, and then by the wire J^8 to the last blade G of the series, as shown at the top of Fig. 4, and then after passing through said blade the current passes by the wire H^6 to the collector-ring H^7, mounted on the insulating-drum C', to the brush H^8, and out through the wire H^9. In this construction it is not necessary for each individual blade to offer much resistance to the passage of the current, as the blades are all placed in series, and the desired effect is attained by the sum of the resistances of all the blades.

While the blades are shown heated in series, yet it will be understood that they could be arranged in multiple, in which case the resistance on each blade would have to be increased to obtain the same degree of heat.

A suitable guard I surrounds the fan for safety during the revolution of the same.

From the foregoing it will be clearly understood that a simple and strong blade may be constructed for a fan-heater wherein all complication of parts, which have heretofore been necessary for the purpose of giving mechanical strength and support to electrical heating resistances, is avoided—for instance, such as a blade supporting the resistance-wires on insulating-pins, or a skeleton frame supporting wire-gauze which forms a heating resistance, and other forms which show a resistance and a blade supporting the resistance, as disclosed in the Dewey patent previously referred to, whereas in my construction the blade which does the work of fanning the air is itself the electrical heating resistance.

I do not limit myself to the arrangement and construction shown, as the same may be varied without departing from the spirit of my invention.

Having thus ascertained the nature of my invention and set forth a construction embodying the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric heating apparatus, an electric motor, a shaft operated by said motor, a hub on said shaft, one or more blades of carbon each molded in an integral mass and decreasing in thickness from its inner to its outer end to heat the same uniformly and provided with a longitudinal slit and transverse slits for lengthening the travel of the electric current through each blade, insulating-arms secured to said hub and connected to said blades, and means for removably securing said blades to said arms.

2. In an electric heating apparatus, an electric motor, a shaft operated by said motor, a hub on said shaft, one or more blades of carbon each molded in an integral mass and decreasing in thickness from its inner to its outer end to heat the same uniformly and provided with a longitudinal slit and transverse slits for lengthening the travel of the electric current through each blade, insulating-arms secured to said hub and connected to said blades, and a screw or screws for removably securing said blades to said arms.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 27th day of January, 1898.

EDWIN F. PORTER.

Witnesses:
A. L. MESSER,
C. A. STEWART.