

No. 638,272.

Patented Dec. 5, 1899.

E. F. PORTER.
APPARATUS FOR HEATING AND AGITATING AIR.

(Application filed Dec. 8, 1897.)

(No Model.)

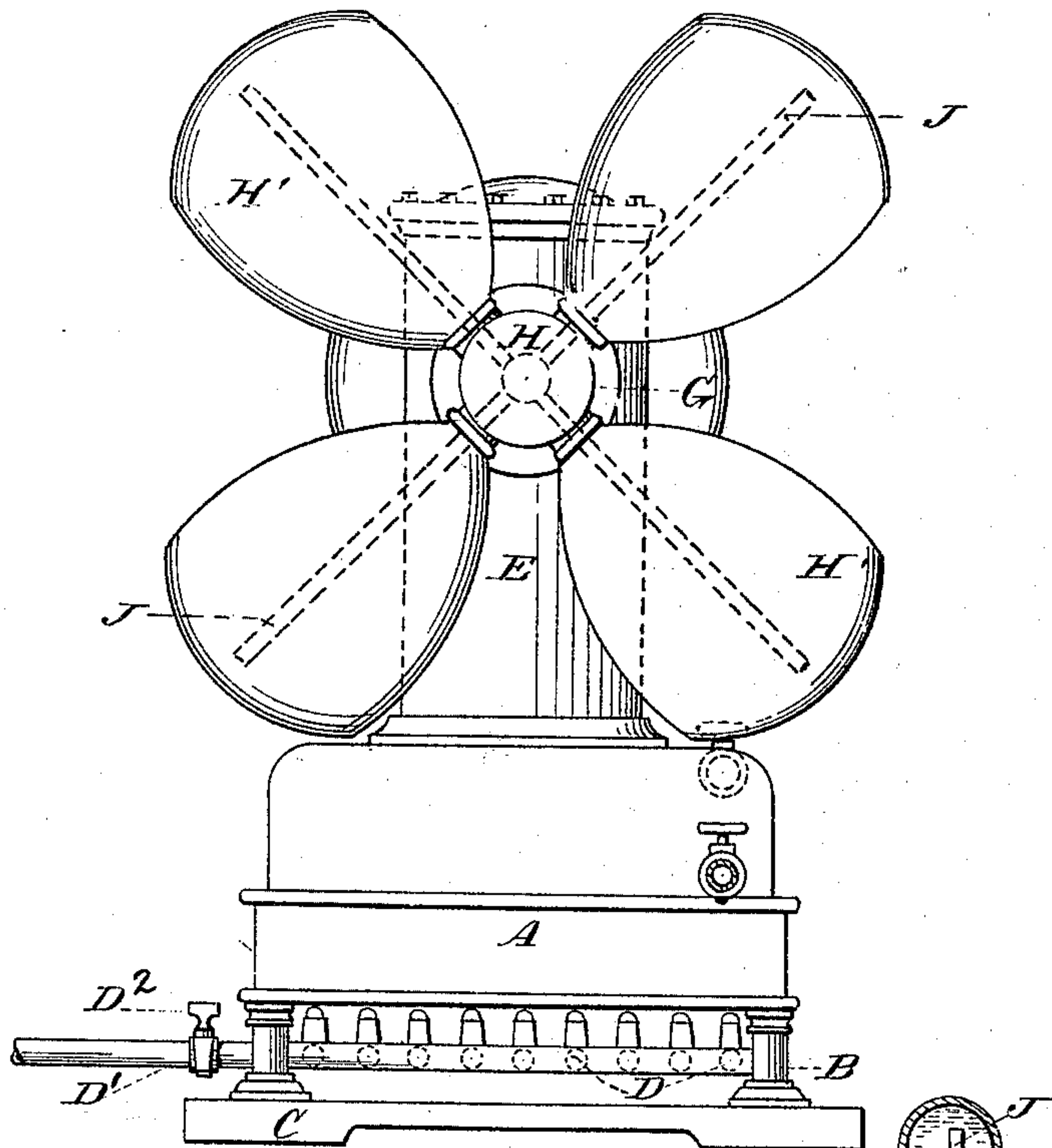


Fig. 1.

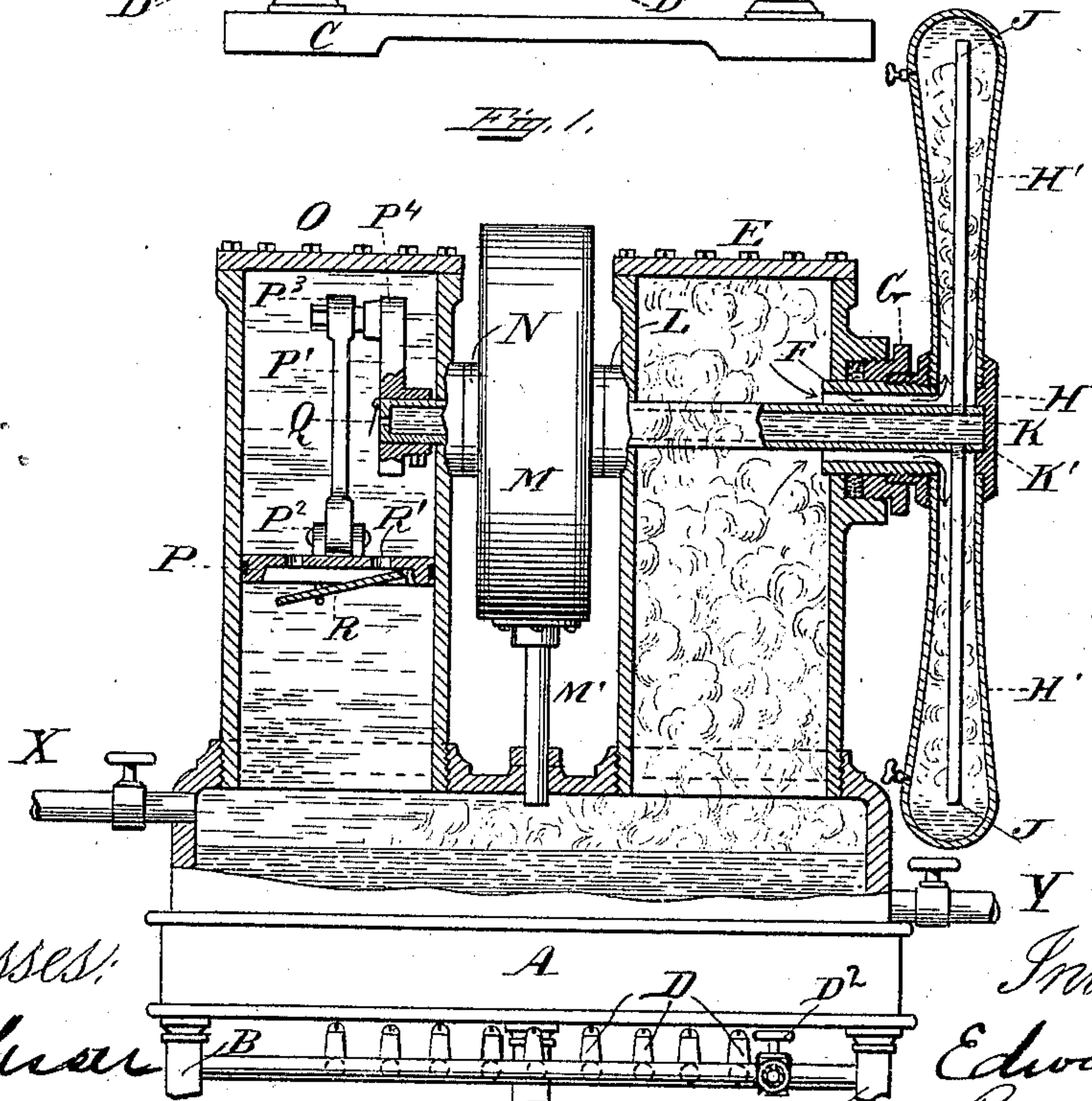


Fig. 2.

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UNITED STATES PATENT OFFICE.

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

APPARATUS FOR HEATING AND AGITATING AIR.

SPECIFICATION forming part of Letters Patent No. 638,272, dated December 5, 1899.

Application filed December 6, 1897. Serial No. 660,958. (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 Apparatus for Heating and Agitating Air, of which the following is a specification.

My invention relates to improvements in apparatus for heating and agitating air; and its object is to economically heat a body of air and evenly distribute the same throughout an apartment.

In carrying out my invention I use a ventilating-fan with hollow blades, in which there is circulated a confined heating medium, whereby the fan-blades are heated and impart in their revolution heat to the air and also cause its diffusion throughout the apartment. In this apparatus the heat is imparted to the air by direct contact of the air with revolving heated blades. By means of this combination radiator-fan a large body of air is more rapidly and thoroughly heated and more rapidly diffused than is possible with the present style of stationary radiator, which for heating depends upon the ordinary circulation of the air, whereas in this apparatus the air is heated by forced convection.

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 front elevation. Fig. 2 is a central longitudinal section through Fig. 1 with the motor in full lines.

Like letters of reference refer to like parts throughout both views.

The boiler A is provided with suitable feet B, resting on a suitable base C, and beneath said boiler A is arranged a series of gas or oil burners D, receiving their supply from the pipe D', having a suitable controlling-valve D². In the top of said boiler A there is secured a supply-chamber E, into which the steam from the boiler A passes. In one side of the chamber E is a suitable opening, in which is located the hollow shaft F, held in place by the stuffing-box G, in which it revolves, and on the outer end of said hollow

shaft F there is screwed a hub H. Screwed into said hub H are four hollow blades H', and within each blade is a pipe J, secured at its inner end to the hollow shaft K, which is secured at its outer end to the hub H at K'. The said shaft passes through the chamber E and out through the stuffing-box L in the side of the chamber E. Beyond said stuffing-box the shaft is connected to and operated by the motor M, which in the present instance is a turbine wheel operated by steam passing from the boiler A through the pipe M'. Beyond the motor M the shaft K passes through the stuffing-box N on the side of the return-chamber O with which the hollow shaft K communicates.

The steam generated in the boiler A passes into the chamber E and from said chamber through the hollow shaft F, passing into and filling the hollow blades H', and by means of said steam said blades are heated, so that upon contact of the air therewith the air is heated, and by the revolution of the fan the air heated by the revolving blades is diffused throughout the apartment.

The water resulting from condensation of steam in the blades H' is carried to the outer ends of the blades by centrifugal force and is carried back to the return-chamber O through the pipes J and shaft K by reason of the exhaust action of the plunger P, working tight in the return-chamber O. To the top of the plunger P there is pivotally connected at P² the piston-rod P', mounted on the pin P³ of the eccentric crank P⁴, which is fast on the shaft K and revolves therewith.

The water resulting from condensation returns to the boiler A through the hollow shaft K, opens the valve Q, which closes as the piston P ascends, and thus prevents return of water to the hollow shaft K, after which the water passes through the ports R', controlled by the valve R, which is open during the ascent of the piston P. After the piston P reaches the upper limit of its stroke and as it begins its downward stroke the valve R is closed by the pressure of the boiler A, and at the same time the downward movement of the plunger P relieves the pressure on the check-valve Q, which opens during the de-

scent of the plunger P and by the exhaust action produces the flow of water through the shaft K into the return-chamber O, and as said piston ascends the water previously condensed is discharged from the ports R' into the boiler A, and the operation continues, as above described.

Owing to the fact that the water condensed is held at the outer ends of the blades by centrifugal force it is necessary to provide means to overcome this action, so that the return of condensation to the boiler is possible; otherwise the blades would in time become filled with water, thereby preventing the circulation of steam through the hollow blades, and the same would remain cold. Therefore it is obvious that the removal of the condensed water from the hollow blades is of paramount importance in order to provide for continually-heated hollow blades.

X and Y represent, respectively, water supply and exhaust pipes for the boiler A.

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 air heating and agitating apparatus, a boiler, means for heating said boiler to generate steam, a fan having hollow blades into which the steam generated in said boiler passes, a hollow shaft on which said fan is mounted, a tube within each hollow blade communicating with said hollow shaft, a motor for operating said shaft, and a pump for removing the water of condensation from said blades, through said tubes and shaft.

2. In an air heating and agitating apparatus, a boiler, means for heating said boiler to generate steam, a fan having hollow blades into which the steam generated in said boiler

passes, a hollow shaft on which said fan is mounted, a tube within each hollow blade communicating with said hollow shaft, a motor for operating said shaft, a piston-chamber with which the hollow shaft communicates, a plunger working in said chamber and connected to and operated by said shaft and adapted to remove the water of condensation from said blades through said tubes and shaft into said piston-chamber.

3. In an air heating and agitating apparatus, a boiler, means for heating said boiler to generate steam, an exposed fan having hollow imperforate blades into which the steam generated in said boiler passes, a hollow shaft on which said fan is mounted, a motor for operating said shaft, and means for removing the water of condensation from said blades through said shaft during the operation of the fan and for returning it to said boiler.

4. In an air heating and agitating apparatus, a boiler, means for heating said boiler to generate steam, a fan having hollow blades into which the steam generated in said boiler passes, a hollow shaft on which said fan is mounted, a tube within each hollow blade communicating with said hollow shaft, a motor for operating said shaft, a piston-chamber with which the hollow shaft communicates, a plunger working in said chamber and connected to and operated by said shaft and adapted to remove the water of condensation from said blades through said tubes and shaft into said piston-chamber, ports through which the water of condensation passes from said plunger to the boiler, and a valve for controlling the passage of the water of condensation through said ports.

In testimony whereof I have hereunto set my hand this 1st day of December, A. D. 1897.

EDWIN F. PORTER.

Witnesses:

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C. A. STEWART.