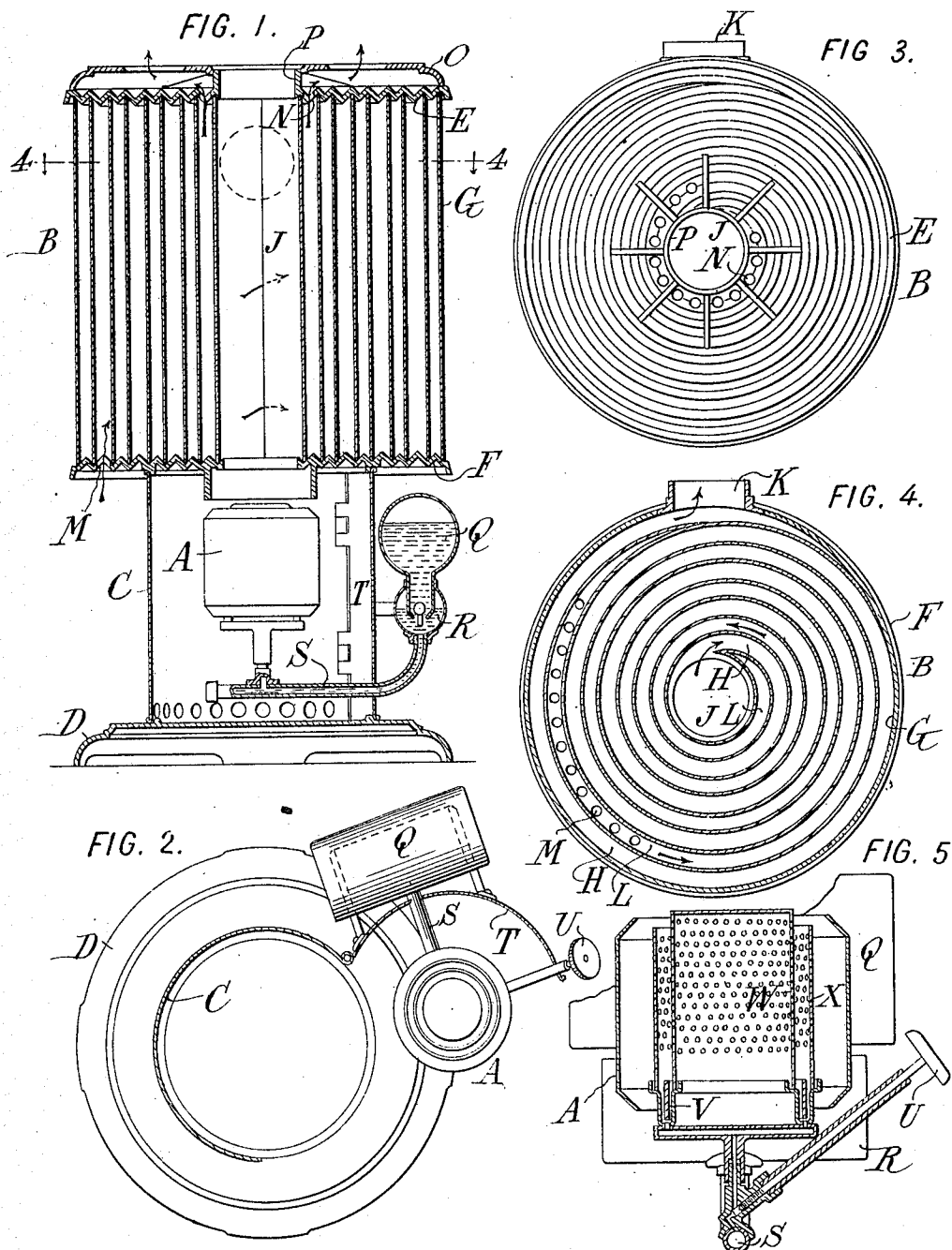


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PATENTED NOV. 12, 1907.

M. W. HALL.
HEATER.

APPLICATION FILED JAN. 2, 1904.



WITNESSES:
Ired White
Rene Ruine

INVENTORS:
Milan W. Hall,
By Attorneys,
Ruthen C. Oraper & Co

UNITED STATES PATENT OFFICE.

MILAN W. HALL, OF NEW YORK, N. Y., ASSIGNOR OF TWO-THIRDS TO GEORGE HOLT FRASER,
OF BROOKLYN, NEW YORK.

HEATER.

No. 870,821

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed January 2, 1904. Serial No. 187,466.

To all whom it may concern:

Be it known that I, MILAN W. HALL, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have
5 invented certain new and useful Improvements in Heaters, of which the following is a specification.

My invention aims to provide a heater specially adapted for heating the air of rooms, and which shall be simple and cheap and highly efficient.

10 The accompanying drawings illustrate an embodiment of the invention.

Figure 1 is a longitudinal section. Fig. 2 is a horizontal section through the base above the burner, showing the latter swung to its outer position. Fig. 3 is a
15 plan of the same with the top plate removed. Fig. 4 is a horizontal section showing the bottom of the heating chamber, on the line 4 4 of Fig. 1. Fig. 5 is a longitudinal section of the burner.

In my improved heater the products of combustion
20 from the source of heat and the air which is to be heated travel through conduits extending alongside each other so as to interchange their temperatures, the products of combustion and the air traveling in opposite directions, so that as the air becomes more highly heated it
25 is adjacent to the more highly heated products of combustion. Consequently there is approximately a constant difference of temperature between the air and the products of combustion. The air as it is discharged from the heater is nearly of the same temperature as
30 the products of combustion fresh from the source of heat, and the products of combustion as they pass out of the heater are of only a high enough temperature to insure a proper draft. The entire apparatus is very simple and easy to use.

35 Referring to the drawings A indicates a burner and B an interchanger carrying the conduits referred to. The interchanger may be supported from a cylindrical base C surrounding the burner and supported in turn from a pedestal D. The interchanger comprises top
40 and bottom corrugated plates E and F respectively, the corrugations being in the form of spirals; and between these corrugated plates are sheets of metal G forming two spiral conduits arranged alongside of each other. These conduits are shown most clearly in
45 Fig. 4. The combustion conduit H opens into the central flue J. The products of combustion enter in the manner indicated by the arrow in Fig. 4, and passing spirally around the several convolutions pass out to the stack or chimney at K. The adjacent spiral conduit L
50 does not connect at any point with the combustion conduit H, being designed to carry the air entirely separate from any products of combustion. The entrance to the conduit L may be by means of a series of apertures M, Figs. 1 and 4, in the lower plate F of

the interchanger, the exit being by way of apertures
55 N in the upper plate E of the interchanger (Figs. 1 and 3). The air moves in the substantially horizontal direction of the arrows in Fig. 4 in passing through its spiral conduit L.

Above the upper plate E of the interchanger may
60 be provided a top O (Fig. 1) having apertures for the discharge of the heated air, and an aperture at the center separated from the heated air by a flange P of the plate E and upon which a kettle or other vessel may be placed and subjected directly to the heat within
65 the central flue J, or which may be closed by an ordinary stove lid. The source of heat may vary. As shown it consists of a coal-oil burner A provided with a reservoir Q connected with a secondary reservoir R adapted to maintain the level of the fluid on the well
70 known principle, the latter being connected by a pipe S with the burner and the whole being carried on a swinging gate T (Fig. 2) forming part of the cylindrical support C.

U is a valve controlling the supply of fluid to the
75 burner. The burner is illustrated in section in Fig. 5. The oil from the pipe S travels up into the lower part of the burner proper and is taken up by the asbestos ring V at the upper edge of which it is lighted. The cylindrical plates W and X form an annular chamber
80 within which the combustion is effected and at the upper end of which a clear blue flame burns.

Though I have described with great particularity of detail an embodiment of my invention yet it is to be understood that the invention is not limited to the
85 particular embodiment disclosed. Various modifications thereof in detail and in the arrangement and combination of the parts may be made by those skilled in the art without departure from the invention

What I claim is:—

90 1. An air heater comprising in combination a hydrocarbon burner, a central vertical combustion chamber open at the bottom to admit products of combustion from the burner, a flue extending spirally around said combustion chamber and at its inner end in communication with said
95 chamber, a discharge pipe in communication with the outer end of said flue and adapted for communication with a chimney so that the products of combustion do not pass into the room to be heated, a spiral conduit for the air to be heated extending alongside the spiral flue for the prod-
100 ucts of combustion and having inlets at the bottom of the outer end of the spiral and outlets at the top of the inner end, whereby the air enters at the bottom, passes around the spiral in an opposite direction to the products of combustion and is heated thereby and is discharged at the top.
105 2. An air heater comprising in combination a source of heat, and an interchanger formed of spirally grooved top and bottom plates E and F and sheets of metal G extending between said plates to form two spiral conduits H and L and a central flue J in communication with the former, the products of combustion being admitted to said central
110 flue and discharged at the outer end of said conduit H,

and said plates E and F being apertured, respectively, at the lower outer end and upper inner end of the conduit L to permit the passage of air therethrough, the air being admitted at the outer end and discharged at the center.

- 5 3. An air heater comprising in combination a hydrocarbon burner, a central vertical combustion chamber above said heater, a spiral passage surrounding said chamber and connected in communication at its inlet end with said combustion chamber, the upper end of said combustion
10 chamber being adapted to be closed by a vessel which re-

ceives heat directly therefrom, and a spiral air conduit extending alongside and intermediate of the convolutions of the spiral flue.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

MILAN W. HALL.

Witnesses:

THOMAS F. WALLACE,
FRED WHITE.