

July 13, 1954

A. KOFF

2,683,796

ELECTRICAL HEATING SYSTEM

Filed Oct. 10, 1952

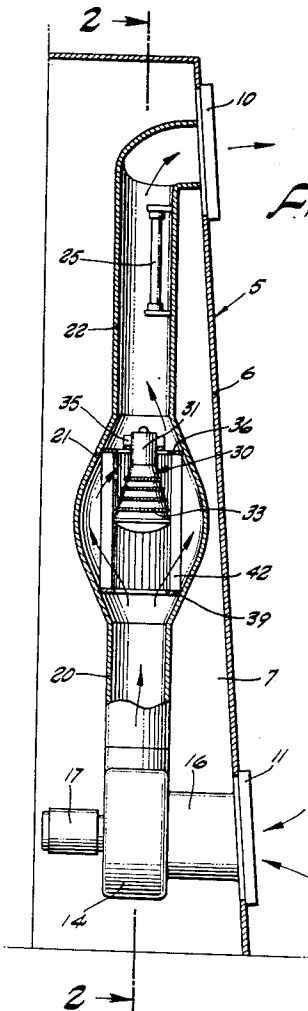


FIG. 1.

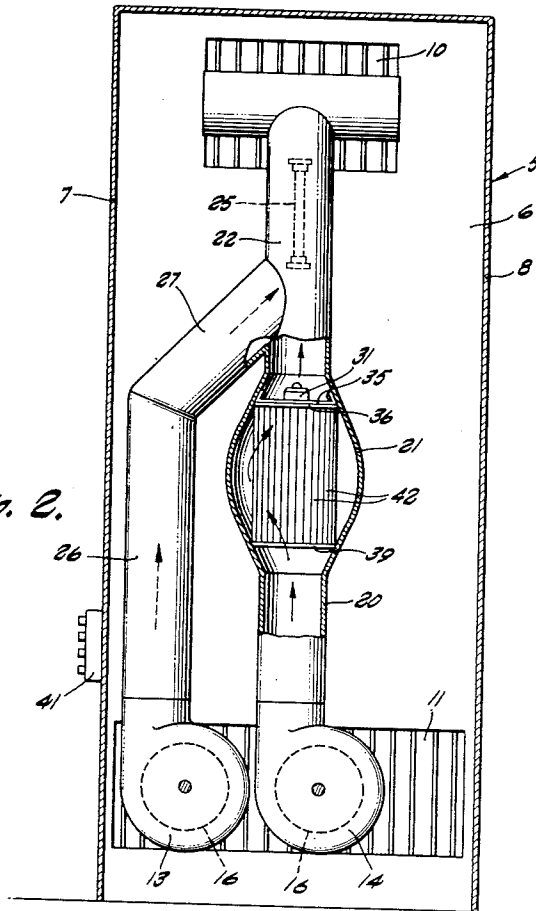


FIG. 2.

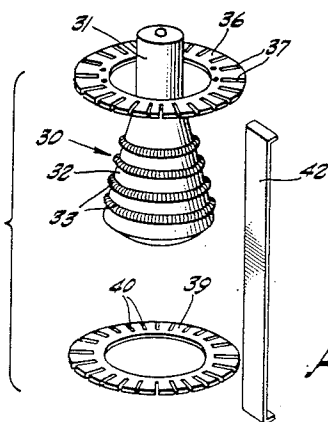


FIG. 3.

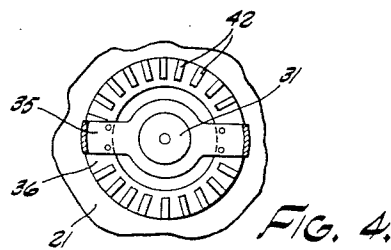


FIG. 4.

INVENTOR.
ALEXANDER KOFF
BY
Carl R. Goshaw
ATTORNEY

UNITED STATES PATENT OFFICE

2,683,796

ELECTRICAL HEATING SYSTEM

Alexander Koff, Culver City, Calif.

Application October 10, 1952, Serial No. 314,049

10 Claims. (Cl. 219—39)

1

This invention relates to heaters, and particularly to an electric type of heater embodying air circulating and distributing mechanisms of the general type disclosed and claimed in my prior co-pending applications, Ser. No. 226,908, filed May 17, 1951, and Ser. Nos. 302,365 and 302,366, filed August 2, 1952.

In these co-pending applications, a double path blower form of air circulator or distributor is disclosed. This general form of air circulator utilizes power blowers, one of which may control the movement of the heated air directly from the heat exchanger or heat source, and the other of which may recirculate the air after it has been forced into the area being heated. Casings or housings enclose the blowers and the air directing conduits, and the air emerges at the top of the housing in a substantially horizontal direction, but above the heads of any persons standing in the area.

The prior applications describe various forms of heat exchangers and heat sources, such as hot air furnaces and hot water or steam radiators, while the present invention is directed to a novel type of electrical heat exchanger, although using an electrical unit well-known in the art. The electrical heat exchanger practically reverses the normal operation of the old unit associated therewith, the new arrangement providing optimum efficiency in heating the air electrically. The unit may also be used for air conditioning when air circulation is desired without heat.

The principal object of the invention, therefore, is to facilitate the control of air in an area to be heated or cooled.

Another object of the invention is to provide an improved air heater, circulator, and distributor.

A further object of the invention is to provide an improved electrical heat exchanger in conjunction with an air circulator and distributor.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the appended claims, the manner of its organization and the mode of its operation will be better understood by referring to the following description, read in conjunction with the accompanying drawings, forming a part hereof, in which:

Fig. 1 is a cross-sectional view of an air heating and circulating unit embodying the invention.

Fig. 2 is a rear view of the invention taken along the line 2—2 of Fig. 1.

Fig. 3 is an exploded view of the elements of the heat exchanger unit, and

2

Fig. 4 is a top view of the heat exchanger unit.

Referring now to the drawings, in which the same numerals identify like elements, a casing 5 having a front panel 6 and side panels 7 and 8 has an air outlet grill 10 at the upper end of the front panel 6 and an air inlet grill 11 at the lower end of the front panel 6. Positioned opposite the lower air inlet panel 11 is a pair of blowers 13 and 14 having their air inlets behind the panel 11 and connected thereto by a housing 16. Motors, one of which is shown at 17, drive the blowers.

The blower 14 forces air up a conduit or pipe 20 having an intermediate enlarged portion 21 and an upper portion 22 with its exit adjacent the grill 10. The air is moved by the blower 14 as indicated by the direction of the arrows. An ultraviolet lamp 25 is positioned in the upper section 22 of the conduit in order to purify the air as described in the above mentioned co-pending applications. The other blower 13 forces air up a conduit or pipe 26 which has its exit into pipe section 22 by means of an interconnecting pipe section 27. Thus, air moved by the blower 13 by-passes the heat exchanger unit 21, now to be described.

The heat exchanger unit includes a heater element 30 having a base 31 with terminals connectable to the regular house source of current. This element has a ceramic conical section 32, around which is wound an electrical heating element such as a wire coil 33. This type of heating unit is now commercially available on the market. The heating element 30 is mounted on cross members 35 attached to the sides of the section 21. Surrounding the base 31 of the element 30 is a ring 36 having a plurality of radial slots 37 therein. A similar ring 39 with slots 40 is positioned below the end of the conical section 32. Inserted in corresponding slots 37 and 40, are a plurality of strips 42 having bent over ends to hold them in the slots of the rings 36 and 39. The width of the strips 42 may be wider than the depth of the slots, so that they provide a circle of fins around the heating element 30. Other means of mounting the fins 42 may be used.

The above described arrangement of the heat exchanger has several advantages which provide it with maximum efficiency in heating the air passing through the section 21. First, by arranging the unit 30 with the large end of the conical section 32 facing the oncoming air and having its closed end spherically shaped, the air is retarded and circulated in spirals around the heating coils 33. That is, there is turbulence of

3

the air around the coils, this entrapped air having a much lower velocity than the air beyond the large portion of the conical section 32, which permits the entrapped air to become heated to a higher temperature. Next, since the coils become red, heat is radiated to the strips or fins 42, which become hot and which heat the air passing between them. As shown by the arrows, the air passes from the inside out at the lower ends of the fins and outside in at the upper ends of the fins. These strips are of copper preferably, because of the excellent heat conducting property of copper. Thus, by proportioning or controlling the air moved by the blower 14 through the heat exchanger, the maximum transfer of heat from the element 30 to the air is obtained.

The by-passed air path within the pipes 26 and 27 has two functions. It can provide a siphoning action to increase the air flowing through the heat exchanger unit, or it may be used separately without the blower 14 to provide simple air circulation to increase the comfort of people in the area in which the air is circulated. If the air intake 11 is positioned near a cool air source, the operation of blower 13 alone will provide a cool air conditioning unit. A switch unit 41 has four buttons, one to control the heating element, one to control blower 13, one to control blower 14, and the last one to control the ultraviolet lamp 25.

I claim:

1. An air heating system comprising a casing having an air exit at the top thereof and an air intake at the bottom thereof, an air path formed by a blower adjacent said air intake and a conduit from said blower and having its exit at the top of said casing, and a heat exchanger within said conduit, said heat exchanger including an electrical heating unit surrounded by radial fins through which the air in said path passes twice.

2. An air heating system comprising a casing having an air exit at the top thereof and an air intake at the bottom thereof, an air path formed by a blower adjacent said air intake and a conduit from said blower and having its exit at the top of said casing, and a heat exchanger within said conduit, said heat exchanger including an electrical heating unit surrounded by radial fins, said electrical heating unit being conical in shape, the large end of said unit being closed and facing the oncoming air.

3. An air heating system in accordance with claim 1, in which a second air path is provided parallel with said first mentioned air path and terminating in said first mentioned conduit beyond said heat exchanger for siphoning air along said first mentioned air path.

4. An electrical air heater comprising an upright, substantially rectangular casing, a conduit extending from an opening at the bottom of said casing to an opening at the top of said casing, an electrical heat exchanger within said conduit, and a second conduit extending from said lower opening to said first mentioned conduit at a point above said heat exchanger for siphoning air through said first mentioned conduit.

5. An electrical air heater in accordance with claim 4, in which said heat exchanger is an electrically heated cone having its large end closed and facing the oncoming air in said first mentioned conduit.

6. An electrical air heater in accordance with claim 5, in which a plurality of spaced vertical

4

fins are positioned around said cone, said fins becoming heated from said cone for heating air passing between said fins, the air on the side of said cone having less velocity than the air passing between said fins.

7. An electrical air heater comprising an upright, substantially rectangular casing, a conduit extending from an opening at the bottom of said casing to an opening at the top of said casing, an electrical heat exchanger within said conduit, said heat exchanger being an electrically heated cone having its large end facing the oncoming air in said conduit, a plurality of spaced vertical fins positioned around said cone, said fins becoming heated from said cone for heating air passing between said fins, the air on the side of said cone having less velocity than the air passing between said fins, and a second conduit extending from said lower opening to said first mentioned conduit at a point above said heat exchanger, the air in said first mentioned conduit passing twice between said fins.

8. An electrical air heater comprising an upright, substantially rectangular casing, a conduit extending from an opening at the bottom of said casing to an opening at the top of said casing, an electrical heat exchanger within said conduit, a second conduit extending from said lower opening to said first mentioned conduit at a point above said heat exchanger, and blowers in said conduits adjacent said lower opening, the moving air in said second conduit siphoning the air through said first mentioned conduit.

9. An electrical air heater comprising an upright, substantially rectangular casing, a conduit extending from an opening at the bottom of said casing to an opening at the top of said casing, an electrical heat exchanger within said conduit, a second conduit extending from said lower opening to said first mentioned conduit at a point above said heat exchanger, and blowers in said conduits adjacent said lower opening, said heat exchanger being positioned in an enlarged portion of said first mentioned conduit, said exchanger including a conical form of heater unit having its closed large end extending downwardly.

10. An electrical air heater comprising an upright, substantially rectangular casing, a conduit extending from an opening at the bottom of said casing to an opening at the top of said casing, an electrical heat exchanger within said conduit, a second conduit extending from said lower opening to said first mentioned conduit at a point above said heat exchanger, and blowers in said conduits adjacent said lower opening, said heat exchanger being positioned in an enlarged portion of said first mentioned conduit, said exchanger including a conical form of heater unit having its closed large end extending downwardly, and separated radial fins around said heater unit, the majority of the air through said exchanger passing twice through said fins.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,416,601	Boone	May 16, 1922
1,754,232	Fisher	Apr. 15, 1930
2,007,102	Wallace	July 2, 1935
2,347,954	Kiely	May 2, 1944
2,471,784	Seifner et al.	May 31, 1949
2,475,910	Morrison	July 12, 1949