Jan. 31, 1928.

1,657,808

A. STEFFEN

ELECTRIC HEATER

Filed Aug. 11, 1925

Fig. 1.

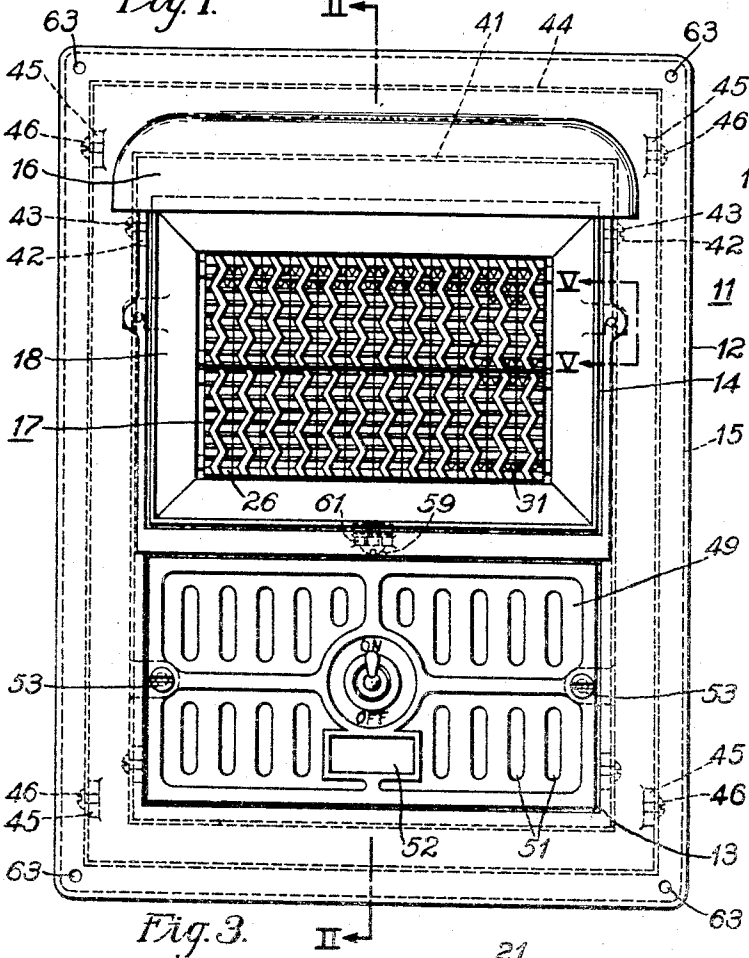


Fig. 2.

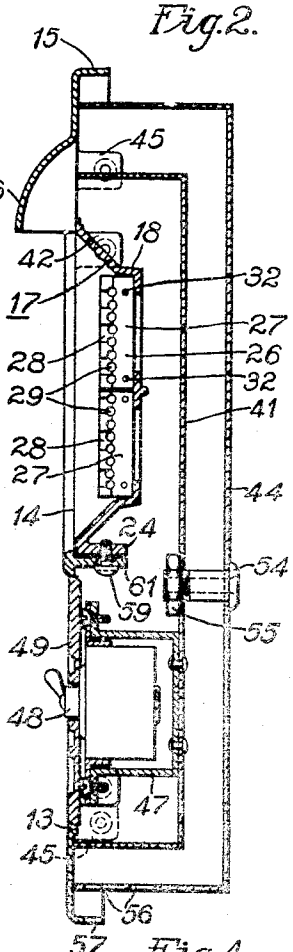


Fig. 3.

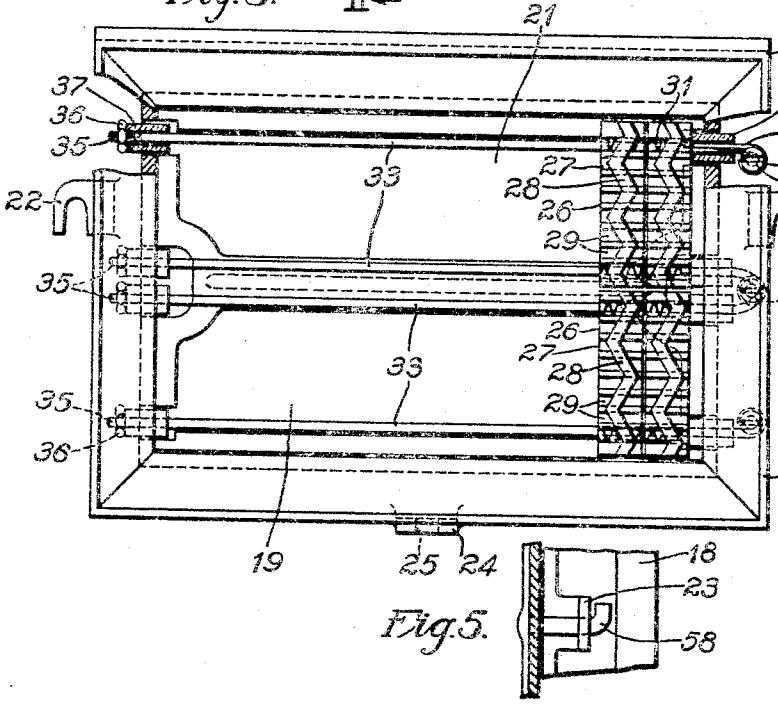


Fig. 4.

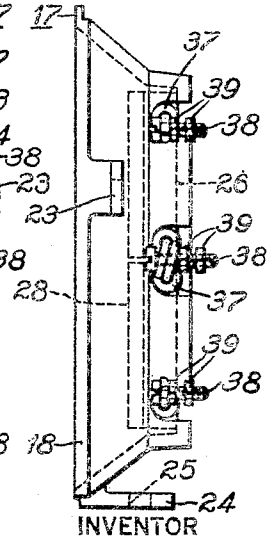


Fig. 5.

INVENTOR

Adolf Steffen

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UNITED STATES PATENT OFFICE.

ADOLF STEFFEN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO ADAMS BROS. MFG. CO., INC., A CORPORATION OF PENNSYLVANIA.

ELECTRIC HEATER.

Application filed August 11, 1925. Serial No. 49,540.

My invention relates to heating units and particularly to electric wall heaters.

One object of my invention is to provide a relatively simple, compact, and inexpensive electric heater.

Another object of my invention is to provide an electric heater of light weight that may be easily and quickly mounted in a wall, and that will permit of removing and inserting the electric heating unit from the front thereof.

In practicing my invention, I provide a metal frame, having an opening therein, and a dished metal member having a plurality of bars of refractory electric-insulating material located therein which support a resistor member at their front surfaces. A plurality of metal casings are located back of the metal frame to enclose the heating unit and a control switch, at the back thereof. Means integral with the frame are provided to permit air to circulate through said casings to cool the same.

In the drawings,

Figure 1 is a view, in front elevation, of an electric heater embodying my invention,

Fig. 2 is a view, in vertical section therethrough, taken on the line II—II of Fig. 1,

Fig. 3 is a view, in rear elevation, of an electric heating unit embodying my invention,

Fig. 4 is a view, in end elevation thereof, and,

Fig. 5 is a fragmentary view, taken on the line V—V of Fig. 1.

A heater 11 comprises a metal frame 12 that is preferably made of relatively thin, substantially flat metal, in the form of a casting, having a lower opening 13 and an upper opening 14 therein, each opening being of substantially rectangular contour. An integral peripheral flange portion 15 is provided on the frame 12, and extends backwardly therefrom at substantially right angles thereto, as shown more particularly in Fig. 2 of the drawings. A forwardly-projecting hood portion 16 is provided immediately above the upper opening 14 and serves a plurality of purposes to be hereinafter set forth.

An electric heating unit 17, normally operatively supported by the frame, comprises a dished metal member 18, of substantially rectangular contour, that has a plurality of openings 19 and 21 in its bottom portion. The metal walls of the member 18 are made relatively thin in order that it may be light in weight and that it may have a relatively small heat-storage capacity. It is provided with integral notched supporting lugs 22 and 23, located at the two sides thereof, and with an integral securing lug 24 at the bottom portion, the lug having a screw-threaded opening 25 therein.

A plurality of bars 26, of refractory electric-insulating material, are located in side-by-side relation in the member 17, their ends operatively engaging integral bottom portions of the member 17, and covering the two openings 19 and 21. Each of the bars 26 comprises a body portion 27 and a relatively narrow top portion 28, extending in zigzag shape along the body portion. A plurality of laterally-extending openings 29 are located partially in the body portion and partially in the top portion. A helically wound resistor member 31 is supported by the bars 26 and extends through the openings 29. This provides a heating element that extends substantially uniformly over the surface occupied by the bars 26.

Each of the bars 26 is further provided with two spaced openings 32 extending laterally through the body portion adjacent to the two ends thereof, and a metal wire or rod 33 extends through each of these openings, whereby the bars are maintained in their proper operative positions relatively to each other. The rods 33 are made long enough to extend through the end flanges of the member 17 (as shown more particularly in Fig. 3) and are each provided with a return bent end portion 34 at one end thereof, and a screw-threaded end portion 35 at the other end thereof, having a nut 36 located thereon. Insulating bushings 37 are mounted on the rods 33 adjacent to the end portions thereof, to insulate the rods from the flange portions of the member 17.

The resistor member 31 that is supported by the bars 26 covering the opening 19 is preferably made of a single length of wire, the two ends of which are connected to the return-bent end portions 34 of the two bars 33 supporting the bars 26. The ends of the wire may be secured to the return-bent portions 34 by machine screws 38 having nuts 39 mounted thereon. The same construction is employed in the other half of the heating unit, that is, in those bars covering the open-

ing 21, and the return bent portions of the two rods 33 located closely adjacent to each other are so located that one is superposed on the other as is shown in Figs. 3 and 4 of the drawings. A single machine screw 38 extending therethrough serves not only to hold the two halves of the heating unit in proper operative positions relatively to each other, but serves also to effect the electrical connection of the two ends of the resistors to the rods, and also serves to electrically connect the two parts of the resistor to each other.

An inner casing 41 is provided, and is made of relatively thin sheet metal. It is fitted against the rear surface of the member 12 and its dimensions, both laterally and longitudinally are such that it extends around the two openings 13 and 14. A plurality of lugs 42 are cast integral with the rear surface of the frame 12 and the casing 41 is held in its proper operative position by machine screws 43 extending through the sides of the casing 41 and into the lugs 42. An outer casing 44, also made of thin sheet metal, is somewhat larger in all of its dimensions than the inner casing 41 in order to provide an air space between the two casings at the back of the frame 12. A plurality of integral lugs 45 are provided and the outer casing 44 is secured in its proper operative position at the back of the frame 12 by machine screws 45 extending through the side walls of the casing and into the lugs 45.

A member 47, of substantially U-shape, has its intermediate portion secured against the inner surface of the inner casing 41 substantially centrally of the opening 13. A switch 48, here shown as a toggle switch, is supported by the member 47 in such manner that the operating member thereof projects through a suitable opening in an ornamental cover plate 49 that is provided to close the opening 13. The front surface of the plate 49 may be ornamented in any suitable or desired manner and is provided with a plurality of openings 51 therein and with a suitable space to receive a name plate 52. The member 49 is held by two machine screws 53 at the edges thereof. A suitable bushing 54 extends through the rear walls of the inner and of the outer casings and is provided with a screw-threaded nut 55 thereon, to permit of introducing the supply circuit conductors into the interior of the inner casing where connection may be made to the control switch 48.

The bottom portion of the outer casing 44 is provided with a plurality of openings 56 therein, and the bottom portion of the flange 15 is provided with recesses 57 therein. The present heater is particularly designed for use as a wall heater, a suitable opening being provided in a wall into which all that part of the heater lying back of the edge of the flange portion 15 is adapted to fit. The recesses 57 permit air to enter and then to flow through the openings 56 into the space between the inner and the outer casings toward the upper part of the heater and then downwardly back of the hood 16. This cools the rear part of the heater unit and prevents any excessive rise of temperature of the outer casing which may be located quite close to portions of the wood structure of the wall. Air may also enter through the openings 51 in the plate 49 and flow past the switch 48 and upwardly back of the heater unit and outwardly under the hood 16. In this way convection currents of air are established which make use of the heat that might otherwise be lost from the back part of the heater, these currents of air flowing out into the room to heat the same.

Air will also flow along the front of the heater, particularly so as the resistors are to be operated at a radiant heat, and the amount of energy translated into heat is relatively large in a heater unit of this kind. The heated air strikes the upper beveled face of the dished member 18, and there is a marked tendency to deposit dust on this beveled face. As I preferably cover the entire front surface of the frame 12 and of the closure member 49 with white enamel in order to obtain a decorative effect, it is highly desirable that the accumulation of dust on the enameled surface be prevented. I have found that the hood 16 tends to prevent the deposit of dust on the front surface of the frame above the heating unit, for as noted above, any dust in the air heated at the front of the heating unit is deposited on the upper beveled face of the member 18.

A pair of hooked members 58, made of wire, are provided adjacent to the sides of the upper opening 14 and have one end thereof cast into the frame, this construction being shown in the fragmentary view of Fig. 5. The assembled heating unit as shown in Figs. 3 and 4 of the drawings may be easily and quickly placed in its proper operative position in the frame 12 by moving it into its place therein, tilted and turned from its final operative position in order to permit it to enter the opening 14. It is then so moved as to make the plane thereof substantially parallel with the plane of the member 12 and the notches in the lugs 22 and 23 are then caused to rest upon the supporting members 58. If the cover plate 49 has been removed it is possible to cause a machine screw 59 to project through a lug 61 on the rear surface of the frame immediately below the opening 14 and to cause it to enter the screw-threaded opening 25 in the lug 24. In this way the heating

unit comprising the dished member 18 is supported at only two points by the supporting members 58, the dimensions and relative locations of the lugs 61 and 24 being such that there will always be a space therebetween.

The front surface of the member 18 is held away from the rear surface of the frame 12 in order that the amount of heat transferred from the heating unit to the frame may be as small as possible. The above described method of supporting the heating unit provides a minimum number of supporting points together with a single point at which a steadying connection between the two parts is provided. This ensures that substantially all of the heat generated in the heating element will be available for radiation in a forwardly direction, either directly from the resistor, or reflected from the beveled front surfaces of the dished member 18.

The frame 12 may be provided with a plurality of openings 63 at the respective corners through which suitable securing screws may extend into the wall against, and in which, it is to be located.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and all such modifications are intended to be covered by the appended claims.

I claim as my invention:—

1. In an electric heater, in combination, a main frame having an opening therein, supporting lugs secured to said frame at the two sides of the opening and extending rearwardly therefrom, a heating unit insertible from the front into said opening and having a hook member at each side thereof for engaging the supporting lugs.

2. In an electric heater, in combination, a main frame having an opening therein, a rearwardly extending supporting lug secured to said frame at each side of the opening, a heating unit insertible into and removable from said frame through said opening and having a hook member at each side thereof for engaging the supporting lugs, and means at the bottom of said opening for holding the heating unit tightly on said supporting lugs.

3. In an electric heater, in combination, a main frame having an opening therein, a rearwardly-extending supporting lug secured to said frame at each side of the opening, a heating unit embodying a dished frame and a hook member at each side of the frame for engaging a supporting lug, the cooperating hook and lug being so shaped as to hold the dished frame away from the main frame to reduce heat flow therebetween.

4. In an electric heater, in combination, a light weight radiant heating unit comprising a dished metal frame having an opening in the bottom thereof, a plurality of refractory bars located in side-by-side location in said opening and having alined openings therethrough, a resistor member extending through said openings and distributed uniformly over the front surface of said set of bars, and a pair of spaced rod members extending through the refractory bars and through said metal frame for holding them in said frame opening.

5. In an electric air heater, in combination, a main frame having an opening therein, a forwardly removable heating unit embodying a dished frame having an open bottom, refractory bars in the open bottom and a heating element supported by said bars, and two cooperating hook members on each of said frames for supporting the dished frame in said main frame opening, and out of engagement with said main frame.

6. In an electric air heater, in combination, a main frame having an opening therein, a heating unit embodying a dished metal frame forwardly removable from said main frame opening, and cooperating means on the said frames for supporting the heating unit from said main frame at two spaced points only.

In testimony whereof, I have hereunto subscribed my name this 4th day of August, 1925.

ADOLF STEFFEN.