Dec. 13, 1927. 1,652,686

J. SCHOENFELD

COMBINATION RADIANT AND CONVECTION HEATER

Filed April 13, 1925 2 Sheets-Sheet 1

Fig. 1.

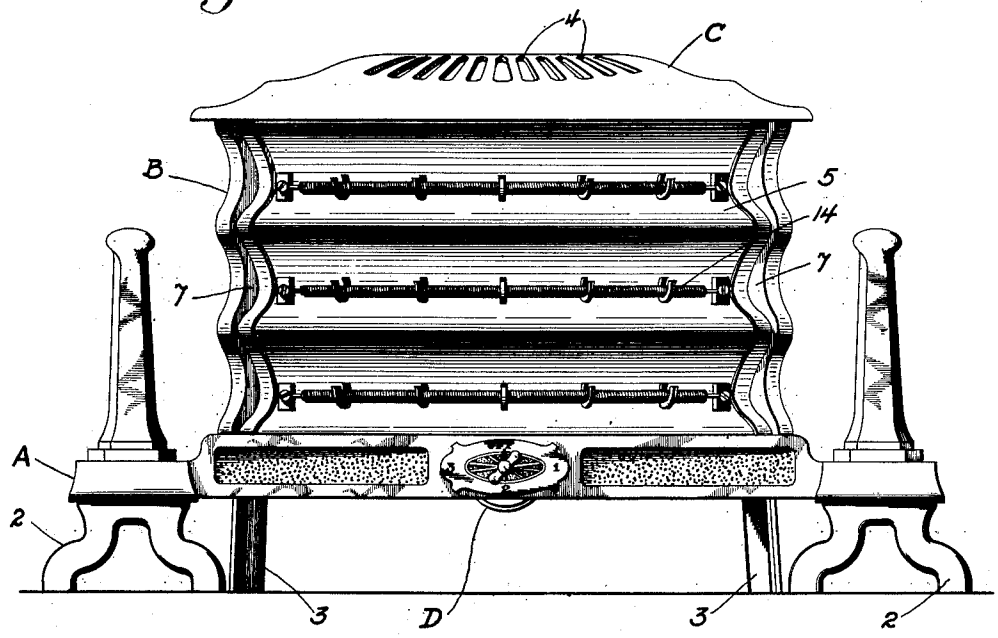
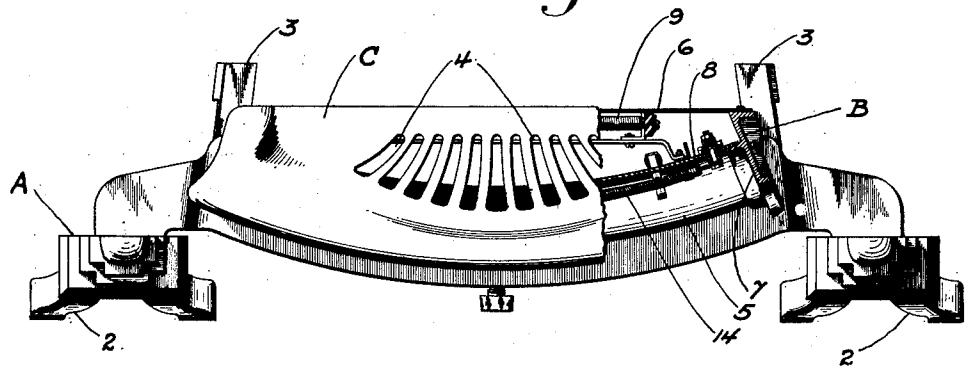


Fig. 2.



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Fig. 3.

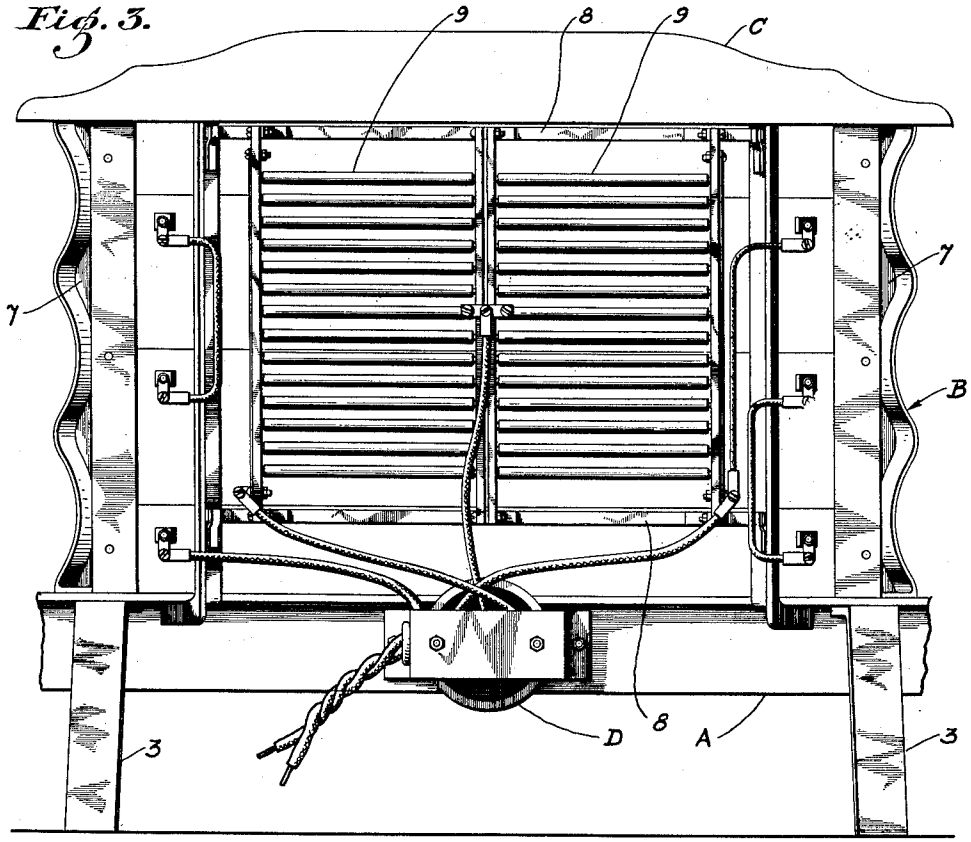


Fig. 4.

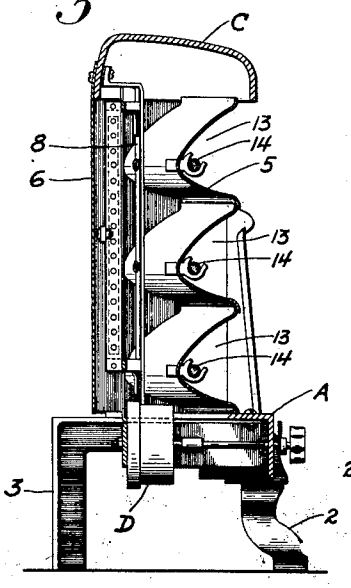
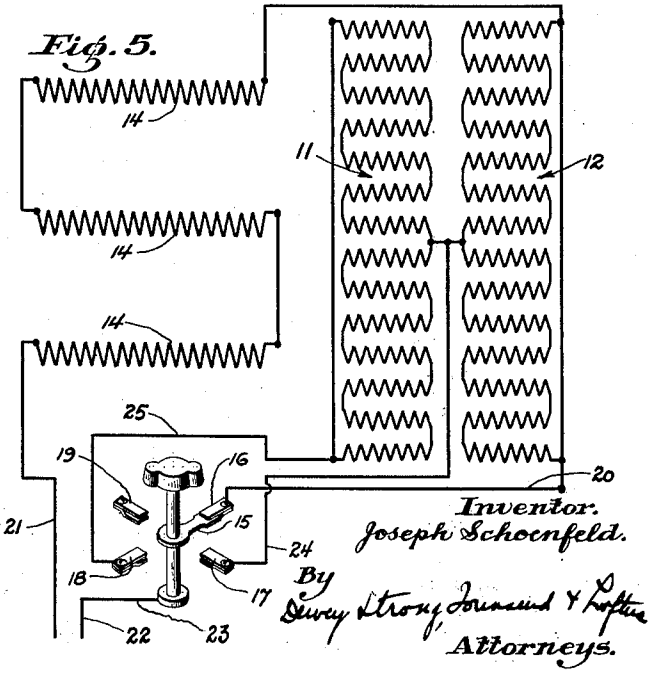


Fig. 5.



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UNITED STATES PATENT OFFICE.

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COMBINATION RADIANT AND CONVECTION HEATER.

Application filed April 13, 1925. Serial No. 22,621.

This invention relates to electric heaters, and especially to a combined radiant and convection electric heater.

The object of the present invention is to generally improve and simplify the construction and operation of electric heaters, to provide a heater which is capable of transmitting heat either by radiation or convection, or by the combined action of both, and further, to provide means whereby the amount of heat transmitted by radiation or convection may be regulated.

One form which the electric heater may assume is illustrated in the accompanying drawings, in which

Fig. 1 is a front view of the heater;

Fig. 2 is a plan view partly in section;

Fig. 3 is a rear view of the heater;

Fig. 4 is a central vertical sectional view taken on line 4—4 of Fig. 1;

Fig. 5 is a diagrammatic view showing the heating elements and the switch controlling the circuits therefor.

Referring to the drawings in detail, particularly Figs. 1 and 2, A indicates a base member supported by a pair of front legs 2—2 and a pair of rear legs 3—3. Mounted on the base section is a casing generally indicated at B, and supported on top of the casing is a cover section C, in which is formed a plurality of air outlet openings generally indicated at 4. The casing proper consists of a front plate 5, a rear plate 6, and a pair of end plates 7—7. A chamber is formed between the plates 5, 6, and 7—7, and this chamber is open at the top and bottom, the object being to permit air to circulate freely through the chamber in an outward direction. That is, the base section is open to permit air to freely enter the chamber, and the cover plate C is provided with openings 4 to permit the air to freely escape. Mounted within the chamber and suitably secured to the base and the top section is a frame generaly indicated at 8. Supported on the frame is a plurality of electric resistance elements such as shown at 9. These elements are divided into two groups, 11 and 12, the heating elements 11 and 12 serving the function of heating the air in the chamber and thereby inducing a continuous upward circulation of air. The front plate 5 is bent or shaped with a die to form a plurality of grooves or channels generally indicated at 13. These grooves extend from end to end of the plate, and they are substantially parabolic in cross-section. Heating elements such as shown at 14 are disposed one in each groove, and will hereinafter be referred to as the radiant elements, while the heating elements 11 and 12 will be referred to as air-heating elements. The plate 5 serves two functions, first, that of reflecting the heat and light rays emitted by the heating elements 14; and secondly, that of heating the air chamber. The front portion of plate 5 is covered with a reflecting substance, and it is for this reason that most of the heat and light rays emitted by the elements 14 are projected in the form of radiant energy. A certain amount of the heat is, however, absorbed by radiation and conduction, and plate 5 thus becomes heated. This heat is transferred by convection to the air passing through the interior chamber, and it may therefore be stated that the elements 14 serve two functions; first that of producing radiant energy, and secondly that of heating the air by convection.

A switch generally indicated at D is provided for the purpose of regulating the flow of electric current through the several heating elements. The switch is diagrammatically illustrated in Fig. 5, and it is provided with a switch arm 15 and four contacts indicated at 16, 17, 18 and 19. Contact 16 is connected through a wire 20 with the heating elements 11 and 12, and also with the radiant elements 14, these last-named elements being in turn connected with the ground or return circuit, as indicated at 21. The incoming current enters at 22, passes through wire 23, switch arm 15, and then through the contact with which the switch arm aligns. Contact 17 is connected with a wire 24, and this connects with the central portion of the heating elements 11 and 12. Contact 18 is connected with a wire 25, and this is connected with the lower end of the heating elements 11. When a switch is arranged and connected in the manner shown in Fig. 5, it is possible to pass all of the current through the radiant elements only if desired. It is also possible to pass the current through one-half the heating elements and then through the radiant elements, by connecting them in series; or it is possible to pass the current through all of the elements by connecting them all in series. If the switch arm 15 connects with contact

16 the current will enter through wire 22 and will pass through the switch arm 15 and contact 16, and then wire 20, which connects with the elements 14. These are connected in series, and are also connected with the return wire 21. In other words, when engagement is made with contact 16, all of the current will flow through the radiant elements, and substantially all the heat produced will be projected radiantly. If it is desired to heat the air partially by convection and partially by radiation, the switch arm 15 is swung into engagement with contact 17. The current entering wire 22 will then pass through the switch arm 15, contact 17, and the wire 24. It will then pass through the heating elements 12, and will then pass through wire 20 and the radiant elements 14. In other words, in this position of the switch, a series connection is made between half of the heating elements and all of the radiant elements, and heat will be produced both by radiation and by convection. If it is desired to transmit all of the heat by convection, switch arm 15 is moved into engagement with contact 18. The current will then pass through wire 25 and will then flow through the heating elements 11 and 12 and the radiant elements 14. In other words, a series connection will be made between all of the elements and practically all heat will be transmitted by convection, as the radiant elements will assume such a low temperature that the heat generated will be transmitted more by convection than by radiation. The induced air flow through the air-circulating chamber will be increased, as both heating elements 11 and 12 are operating. It is for this reason that practically all heat will be transmitted by convection.

From the foregoing, it will be seen that a heater has been provided in which electric current may be converted into radiant energy only if desired. Also, that the current may be transmitted both by radiation and convection, and that all of the current may be converted into heat and transmitted to the air by convection. While certain features of the present invention are more or less specifically illustrated, I wish it understood that various changes may be made within the scope of the appended claim, and similarly, that the materials and finish of the several parts of the heater may be such as the experience and judgment of the manufacturer may dictate.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

An electric heater comprising a vertically disposed substantially rectangular shaped casing formed of a front plate having an exterior reflecting surface formed thereon, a rear plate and a pair of end plates, said plates forming a chamber open at the top and bottom, two sets of electric heating elements disposed within the chamber and causing an upward flow of air through the chamber, electric heating elements disposed in front of the reflector, a switch, and means actuated by the switch for directing the current through the last-named elements only, or through the last-named elements and one-half of the first-named elements in series, or through all of the elements in series.

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