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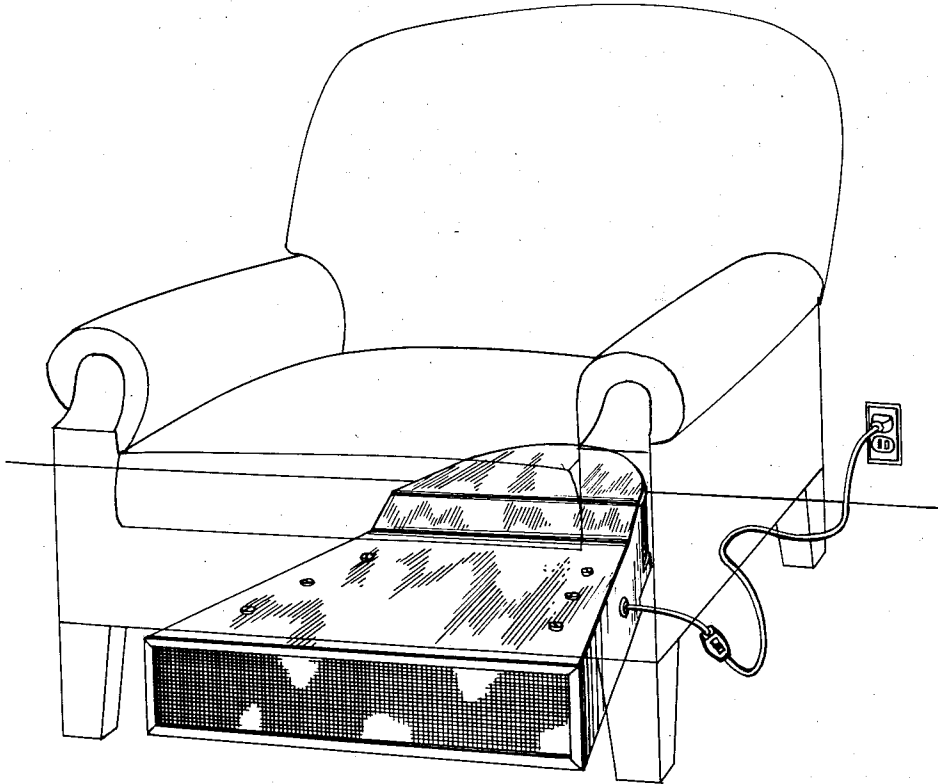
N. W. HATKER
ELECTRIC HEATER

2,565,769

Filed March 2, 1949

2 Sheets-Sheet 1

FIG 1



INVENTOR.

Norman W. Hatker

BY

Munn, Liddy, Alacum & Rich

Attorneys

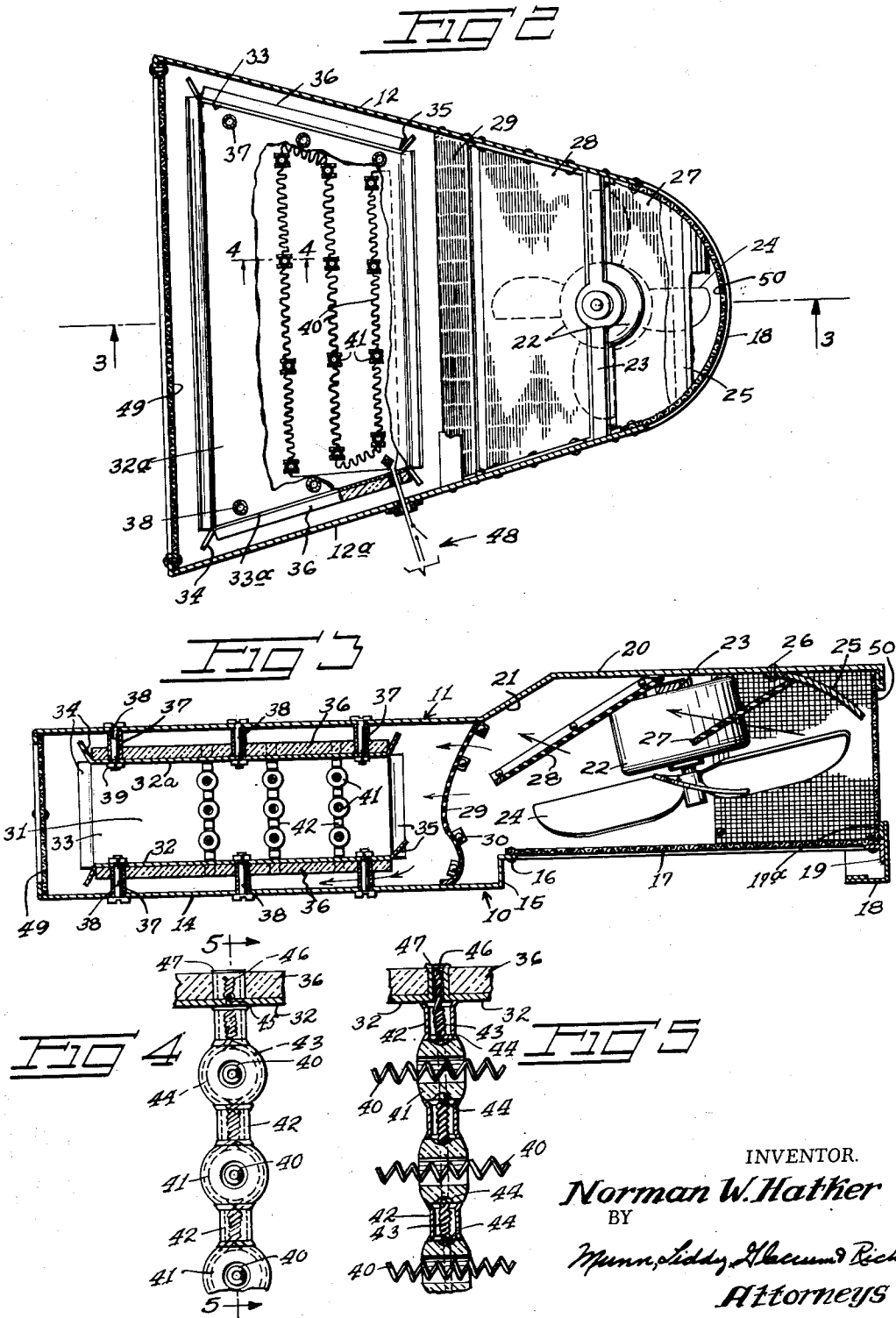
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INVENTOR.
Norman W. Hatker
BY
Munn, Siddy & McCune & Rich
Attorneys

UNITED STATES PATENT OFFICE

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ELECTRIC HEATER

Norman W. Hatker, Chattanooga, Tenn., assignor
to Tennessee Valley Authority, Muscle Shoals,
Ala., a corporation of the United States

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8 Claims. (Cl. 219—39)

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This invention relates to domestic heating appliances and has for its object the provision of a portable or semi-portable electric heater built low and compact enough to enable it to be placed under a sofa, chair or other piece of furniture for effective operation.

A further object of my invention is to provide a convenient heater which because of its low register and surface temperature is perfectly safe for use in the home.

Another advantage of the invention lies in the fact that it may inconspicuously occupy floor space already in use and thus need not hamper the harmonious arrangement of furniture nor interfere with the decorative scheme of a room.

Still another advantage of my heating appliance is that its intake and discharge act directly along the surface of the floor thus, effectively heating the coolest part of the room.

Still other objects and advantages will become apparent from the following description of the present invention illustrated in the accompanying drawing in which:

Figure 1 is a perspective view illustrating a heater embodying my invention and showing in phantom its location beneath a piece of furniture.

Figure 2 is a plan view of a heater embodying my present invention, the heater having its top plate removed and its inner compartment broken away in part to show the heating element.

Figure 3 is an enlarged sectional view taken on line 3—3 of Fig. 2.

Figure 4 is an enlarged sectional view taken on line 4—4 of Fig. 2.

Figure 5 is a sectional view taken on line 5—5 of Fig. 4.

Similar reference numerals, in the several figures, indicate similar parts.

Supplemental heating appliances now in use consist of the conventional wall-type and floor-type heaters. The wall-type heater not only necessitates expensive cutting into the wall, but also requires a certain amount of floor area since an object cannot be placed in front of the unit without blocking the heat or causing heat damage to the surface of the obstructing article of furniture. The latter disadvantage is likewise inherent to the floor-type heater in addition to the obvious space it requires on which to rest.

An equally important objection of the housewife to these conventional heaters is their unavoidable interference with the aesthetic scheme of the home. Repeated attempts to simulate the appearance of an attractive piece of furniture have merely resulted in added manufacturing

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cost of the article without a successful solution to the decorator's problem.

The heater that I have devised affords a more efficient heat producing means and at the same time is compactly designed to be located under a sofa, lounge chair or other piece of furniture in front of which the floor space is normally open and unobstructed. This accordingly permits a free flow of warm air without necessitating a special accommodating arrangement of the furniture in the room. Furthermore, the device is inconspicuous in its hidden position and need not be considered in the harmonious or aesthetic plan of the room furnishings.

A preferred housing or shell for my heating mechanism is shown in Figs. 1 and 2. It comprises a bottom plate 10 and a top plate 11, the two being connected by small machine screws (not shown) to oppositely disposed side panels 12—12^a. In plan these plates have a comparatively wide forward span and are progressively tapered toward the rear where a defining arcuate edge is formed as seen in Figs. 1 and 2.

A forward section 14 of the bottom plate is designed to rest upon the surface of the floor and terminates midway in a vertical wall 15 which joins the forward section to an offset rear section 16 of said plate. A last mentioned section is provided with a central opening 17 which occupies the major portion of the offset section and supplements the rear air intake 17^a thereby affording an increased intake area for supplying cold air to the heating element. The rearward end of the heater is supported by an arcuate leg piece 18 rigidly secured to a downwardly projecting lip 19 formed at the extremity of the offset section 16.

The plate 11 forming the top panel of the heater is a solid sheet of material having a raised rearward portion 20 as shown in Fig. 3. In order to aid in the circulation of air through the casing as well as to augment the graceful lines of the appliance, I prefer to incline the connecting section 21 between the offset section of the top plate 11.

Within the intake compartment defined by offset sections 17 and 20 is an electric motor 22 suspended from a transverse support member 23 and tilted, to incline the axis of its armature, as shown. The motor armature shaft carries a suction fan 24 which draws cold air from the surface of the floor and forces it through the heating chamber of the appliance. By mounting the assembly in the tilted position shown in Fig. 3, the fan is able to effectively serve both the bottom and rear in-

take areas and force a maximum quantity thereof past the heating element circulating it through the room.

The cold air stream drawn into the heater by the fan assembly is directed toward the heating chamber by a series of deflectors. The first deflector consists of an arcuate baffle plate 25 suspended from the under surface of the top section 20 by means of bolts or rivets 26. The major portion of the air current upon entering the casing confronts a pair of inclined foraminous deflectors 27 and 28. These are in the form of miniature louvers having finely divided tilted panels or slats extending transversely the entire width of the chamber, the plates in which they are formed being secured having end flanges attached to side panels 12, 12^a of the appliance.

A final deflecting screen 29, of a similar construction as the preceding deflectors 27 and 28, forms a partition between the intake chamber and the heating compartment and is secured to the side panels through the end tabs 30. I have found that by attaching the deflector 29 so that the surface thereof is reversely curved in a manner substantially as shown in Fig. 2 and Fig. 3, the slats of the screen will uniformly distribute the current of air throughout the heating compartment accordingly resulting in a more uniform and effective final output of warmed air.

The forward compartment of the heater contains an open ended inner duct 31 which comprises oppositely disposed horizontal plates 32, 32^a and vertical side walls 33, 33^a. The free ends of each panel of this inner duct are formed with inclined front and rear flaps 34—35 (Fig. 3) bent outwards at an angle of approximately 60 degrees to control a peripheral stream of surface cooling air in a manner to be later described. An asbestos millboard insulation 36 is fastened to the outer sides of the duct 31 and the combined assembly is held in spaced relation to the four sides of the housing 11 of the heater by means of a plurality of tubular spacers 37. These spacers are placed in a vertical position between the periphery of the duct 31 and the inner surface of the housing. The tubes penetrate the insulating millboard and are rigidly secured to each of the spaced panels by machine bolts 38 which extend through the housing, tube spacer and duct panel to the interior of the heating chamber where each has a nut 39 threaded thereon.

The interior of the inner duct 31 forms the compartment wherein the cold air taken from the surface of the room floor is heated. This compartment contains a traversing coiled wire resistance heating element 40 positioned in tiers as shown in Figs. 3 and 5. The heating coil 40 is carried by a number of vertical supports consisting of apertured ceramic bushings 41 vertically spaced by short lengths of metal tubing 42. As best seen in Fig. 4, the upper and lower bushing of each support are likewise spaced respectively from the horizontal plates 32, 33^a of the duct by similar lengths of tubing.

The successive elements of each support are united in a rigid assembly by wire strands 43 which are lodged in the peripheral recesses 44 of the bushings and twisted together above and below each individual bushing. The free ends of wire at each extremity of a support member are continued through aligned apertures 45 in the duct panels and again twisted as at 46. Metallic sleeves 47 are placed over the projected twisted ends of the wire and crimped thereon to retain

the latter and thus complete a firm support assembly for the heating element 40.

The heating element and fan motor are connected to a conventional electrical lead-in, shown diagrammatically at 48 in Fig. 2. This lead-in passes through one of the side walls 12^a of the heater to provide current from a convenient wall outlet in the room. I also prefer to provide such trade refinements as thermostatic control to protect against overheating in case of fan failure, or fusing of the motor and at the ends of the casing to provide artistic grills or guards. The latter will consist of a forward grill 49 covering the outlet end of the casing and an arcuate grill 50 at its intake end. The additional intake opening 17 paralleling the surface of the floor may advantageously be covered with a porous fabric or relatively closely woven metallic screen to exclude excessive dust or lint from the interior of the heater.

In the operation of my heater, the fan 24 draws cold air through the bottom and rear grills of the heater and impels it through the lower deflectors 27 and 28 causing the air stream to be bent around a very short radius. The stream is evenly distributed to the forward compartment by the deflecting screen 29 where the greater portion of the volumes of the indrawn air is directed through the inner duct 31 to be heated by the coils 40. Simultaneously a portion of the cold air escapes around the outer edges of flaps 35 and thus circulates between the housing and the inner duct and serves to keep the temperature of the outside surface of the heater sufficiently low and to permit its being both safe and easily handled. As this peripheral stream of cooling air reaches the forward flaps 34 it is directed against the inner surface of the housing and is in turn deflected inwardly where it mixes with the heated air before it passes outwardly through the grill 49.

Since, in the preferred form of my appliance, the heating and fan units are individually controlled it will be seen that my invention may be effectively used in warm weather as an air circulating means for cooling a room by the operation of the fan unit alone.

From the foregoing description of my invention it will be seen that by the unique and compact association of the elements shown, I have devised an efficiently performing heater with a maximum overall height of approximately four inches which enables the appliance to be used under an article of household furniture. Since the register and surface temperatures are kept low by the jacket of cooling air, the device is perfectly safe to be used where young children may accidentally come into contact with it. The combined characteristics of efficiency, safety and obscurity make this heater an advancement in household heating appliances.

While a preferred form of the invention has been shown and described, it will be understood that variation in details of form may be made without departure from the invention as defined in the appended claims.

I claim:

1. In a heater for use under an article of furniture, the combination of a shallow casing comprising vertically offset forward and rear compartments having openings therein, a motor and an intake fan in said rear compartment, the blades of said fan being positioned adjacent to and in a plane inclined at an acute angle to the bottom of said rear compartment, an inner duct carried within said forward compartment in

spaced relation to the surfaces thereof, flanges on one end of said duct for directing a portion of air between the spaced surfaces of the duct and said casing, flanges at the other end of the duct for directing the air toward the longitudinal axis of the heater, a heating element within said duct and means for connecting said heater to a source of electrical current.

2. In a heating appliance the combination of a casing comprising vertically offset forward and rear compartments having end openings therein, said rear compartment having an additional opening in the bottom thereof, a motor and intake fan suspended from the top of the rear compartment at an angle thereto, a series of foraminous deflectors within said casing for progressively directing indrawn air toward said forward compartment, an insulated inner duct carried within said forward compartment in spaced relation to the surfaces thereof, means at one end of said duct for directing indrawn cool air around the periphery thereof, a heating element within said duct, means at the other end of said duct for directing said peripheral stream of air inwardly to mix with the heated air from said duct, and an electrical connection for supplying current to said motor and heating element.

3. In a heating appliance the combination of a casing comprising vertically offset forward and rear compartments having end openings therein, said rear compartment having an additional opening in the bottom thereof, a motor and intake fan suspended from the top of the rear compartment at an angle thereto, a series of foraminous deflectors within said casing for progressively directing indrawn air toward said forward compartment, an insulated inner duct carried within said forward compartment in spaced relation to the surfaces thereof, means at one end of said duct for directing indrawn cool air around the periphery thereof, a heating element within said duct, means at the other end of said duct for directing said peripheral stream of air inwardly to mix with the heated air from said duct, independent controls for said motor and heating element and an electrical connection for supplying current to said controls.

4. In a heater for use under an article of furniture, the combination of a shallow casing comprising forward and rear compartments having openings therein, a motor and intake fan in said rear compartment, the blades of said fan being positioned downwardly of the motor and lying in a plane inclined at an acute angle to the horizontal whereby the motor and fan occupy less vertical space to afford shallowness to the compartment, foraminous deflectors for changing the direction of flow of air from said intake fan and directing said air toward the forward compartment, a foraminous partition between the forward and rear compartments having deflecting surfaces thereon for equally distributing the flow of air throughout the forward compartment, an inner duct carried within said forward compartment in spaced relation to the surfaces thereof, flanges on one end of said duct for directing a portion of the air between the spaced surfaces of the duct and said casing, a heating element within said duct and means for connecting said heater to a source of electrical current.

5. In a heater for use under an article of furniture, the combination of a shallow casing comprising forward and rear compartments having openings therein, the bottom of said rear compartment being foraminous and spaced from the

floor of the room to permit additional inlet opening area, a motor and intake fan in said rear compartment, the blade of said fan being positioned downwardly of the motor and lying in a plane inclined at an acute angle to the horizontal whereby the motor and fan occupy less vertical space to afford shallowness to the compartment, deflectors for directing the intake air toward the forward compartment, an inner duct carried within said forward compartment in spaced relation to the surface thereof, means for directing a portion of the air between the spaced surfaces of the duct and said casing, a heating element within said duct, and means for connecting said heater to a source of electrical current.

6. In a heater for use under an article of furniture, the combination of a shallow casing comprising forward and rear compartments having openings therein, the bottom of said rear compartment being foraminous and spaced from the floor of the room to permit additional inlet opening area, a motor and intake fan in said rear compartment, the blade of said fan being positioned downwardly of the motor and lying in a plane inclined at an acute angle to the horizontal whereby the motor and fan occupy less vertical space to afford shallowness to the compartment, foraminous deflectors for changing the direction of flow of air from said intake fan and directing said air toward the forward compartment, a foraminous partition between the forward and rear compartments having deflecting surfaces thereon for equally distributing the flow of air throughout the forward compartment, an inner duct carried within said forward compartment in spaced relation to the surfaces thereof, flanges on one end of said duct for directing a portion of the air between the spaced surfaces of the duct and said casing, a heating element within said duct and means for connecting said heater to a source of electrical current.

7. In a heater having a suction fan for the intake of cold air, a plurality of heating coils spaced vertically with the heater, vertical supports for holding said coils, said supports comprising bushings and intermediate spacers joined by twisted wire strands.

8. In a heating appliance the combination of a casing comprising vertically offset forward and rear compartments having end openings therein, said rear compartment having an additional opening in the bottom thereof, a motor and intake fan suspended from the top of the rear compartment and so positioned that the blades of said fan lie in a plane inclined at an acute angle with the horizontal, said casing being of sufficient shallowness due to the positioning of said fan to permit its use under an article of furniture, a heating element in said forward compartment, and means for conveying electrical current into said appliance.

NORMAN W. HATKER.

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