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ELECTRIC SPACE HEATER AND METHOD OF MANUFACTURE

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FIG. 2.

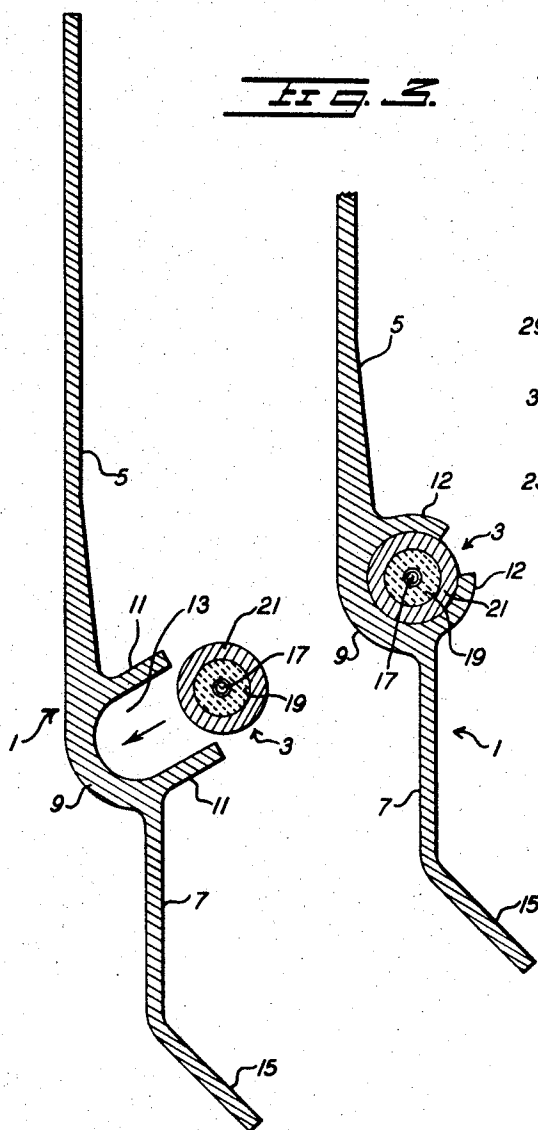


FIG. 3.

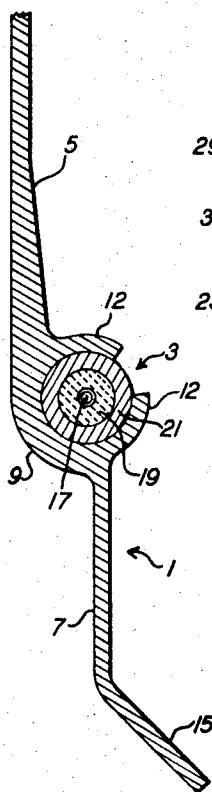
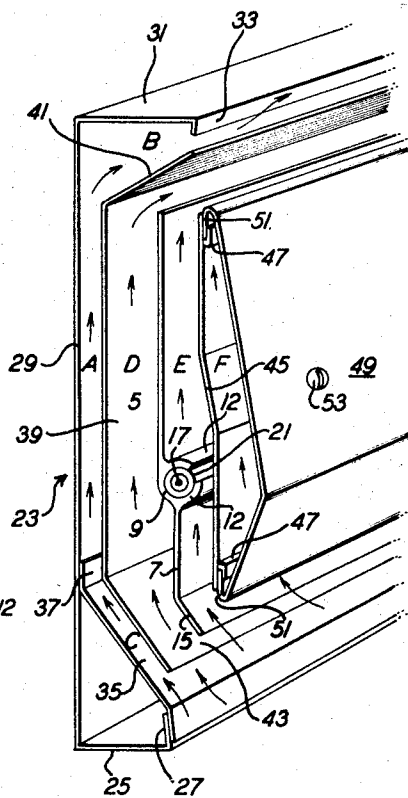


FIG. 1.



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## ELECTRIC SPACE HEATER AND METHOD OF MANUFACTURE

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1 Claim. (Cl. 219—34)

This invention relates broadly to the electric space heater art and in its more specific aspects it relates to a novel type of electric resistance unit embodying heat conduction and dissipation characteristics and the method of manufacturing such unit; and the nature and objects of the invention will be readily recognized and understood by those skilled in the arts to which it relates in the light of the following explanation and detailed description of the accompanying drawings illustrating what I at present believe to be preferred embodiments or mechanical expressions of my invention from among various other forms, arrangements, combinations and constructions, of which the invention is capable within the spirit and scope thereof.

While electric space heaters are now in wide use there are certain unsatisfactory features which are inherent in the types now being produced. These unsatisfactory features are particularly apparent in connection with baseboard heaters where space is limited and size of components is a prime consideration. In baseboard and the like heaters which conventionally are the sole heating means for an area, heating efficiency is essential. It is also highly desirable that baseboard heaters be endowed with long lasting characteristics, not solely for reasons of economy but also because of the difficulties which may be encountered in dismantling the heater for servicing.

Sheathed tubular resistance elements are mass produced and are of relatively low cost and for these reasons would appear to be useful as the heating element in baseboard and the like heaters. However, I have found that these elements alone do not provide sufficient heat because the sheathed tubular resistance elements, per se, lack sufficient conductive surface area for proper heat dissipation into the space to be heated.

Heaters are produced which use elements which are fabricated by threading coiled resistance wire inside of porcelain spacers. Such elements are expensive, short lived and are no more efficient in heating an area than are the aforementioned sheathed tubular resistance elements.

In considering the problem of heating efficiency and economy it must be appreciated that there is insufficient space to utilize a plurality of rows or lengths of resistances in a baseboard heater, nor is it practical to provide a heat reflecting member as is often provided in portable electric space heaters.

In my efforts to use the mass produced low cost metallic sheathed tubular resistance elements in baseboard and the like heaters and still provide an efficient heat producing arrangement I combined the sheathed tubular resistance element with a metallic heat conductive surface providing the necessary heat dissipating area. However, I discovered that merely using a metallic sheathed tubular resistance unit and fixing it to and combining it with a metallic heat conductive surface was not enough and was unsatisfactory for use as the heat producing medium in a baseboard or the like space heater. In use of

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the aforementioned combination there was noise due to expansion of the metals under the temperature rise causing a slippage of the sheathed tubular resistance element relative to the metallic heat conductive surface. In order to provide a practical device a channel was formed in the heat conductive surface and the sheathed tubular resistance was positioned in the channel, however loud pops or cracks resulted which were caused by the building up of pressure to a point necessary to overcome the grip of the channel walls upon the sheath. It will be evident that this tended to reduce the life of the resistance element and the noise produced reduced the commercial value of the combination.

I have found that the noises which were produced and the damaging wear and tear on the element was caused by unequal expansion of the heat conductive surface relative to the metallic sheath housing the resistance element and its insulation.

All noise and undue wear have been eliminated by forming the heat conductive member and the metallic sheath of the element out of metals having the same coefficients of expansions. In this manner the rates of expansion are the same, undue stresses and strains are eliminated and a quiet and efficient heater results.

Unusually satisfactory results have been experienced by forming the heat conductive member or fin of an aluminum and also providing an aluminum sheath for the tubular resistance element. In this manner both of the members will expand at similar rates, there will be no slippage between them and all noises will be eliminated. While I do not intend to limit my unit to one made of aluminum it may be noted that the heat conductivity of aluminum is approximately three times that of, for example, tin, nickel and iron.

I have not only evolved the broad concept generally outlined above but I have also structurally embodied the concept into a practical, efficient heater which may be easily and economically produced. In accomplishing my aims I have used an extruded aluminum shape for the heat conductive and dissipating member and not only have I formed the shape in a manner to cause proper heat dissipation but I also provide it with means receiving the resistance element in heat transfer relation thereto and the means is manipulable in a facile manner to permanently affix the element to the member.

In using an extended aluminum shape I am enabled to vary the shaping of the heat conductive member for different installations, and it will be apparent that this adds to the versatility of my proposal.

A simple and economical method of effecting this combination of the tubular resistance element with the heat conductive member has been devised which presages rapid and economical production of the units.

This combination comprising the sheathed tubular resistance element and the heat conductive member forms a unitary structure which provides for substantial heat dissipation while requiring relatively little space and the unit is particularly adapted for use in baseboard heaters where space allotments for various components are not large. While I shall describe the unit as used in a baseboard heater, it is to be understood that it and the underlying principles involved are adaptable for use in a variety of types of electric space heaters.

My invention is also concerned with the heater assembly involving a unique mounting and arrangement of parts wherein heat convection currents are generated which add to the efficiency of the space heater.

The unitary resistance element and the parts of the heater assembly may be mass produced at low cost.

The heater is of pleasing appearance because of its compactness which is made possible by using the unitary

structure involving the heat conductive member and the tubular resistance element.

With the foregoing general objects, features and results in view, as well as certain others which will be apparent from the following explanation, the invention consists in certain novel features in design, construction, mounting and combination of elements, as will be more fully and particularly referred to and specified hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a perspective view illustrating a baseboard heater including the unitary structure of the heat conductive member and the tubular resistance element.

Fig. 2 is an end view in section of the extruded heat conductive member and illustrating a sheathed tubular resistance element in position to be disposed in the channel formed in the member.

Fig. 3 is an end view in section of the completed unitary structure of the heat conductive member and the sheathed tubular resistance element, with parts of the member broken away.

In the accompanying drawings, and particularly Figs. 2 and 3 thereof, I have used the numeral 1 to designate in its entirety the heat conductive member and the numeral 3 to designate in its entirety the sheathed tubular resistance element.

The heat conductive member comprises an extruded shape preferably of aluminum, provided with an upper fin 5 and a lower fin 7. The upper and lower fins are connected by an intermediate curved rib or core section 9 from the upper and lower sides of which flanges 11 project forwardly forming a channel or recess 13. If desired the lower fin 7 may be formed at its end with a section 15 extending forwardly at an angle with respect to the major portion of the fin.

The heat conductive member 1 is provided the fabricator of the unit in extruded lengths in the shape and form illustrated in Fig. 2 and the fabricator may cut the lengths to provide the members in any desired individual length. It will be appreciated that the shaping dimensions etc. of the fins may be varied to suit the requirements of specific installations without departing from the spirit and scope of my invention.

The sheathed tubular resistance element 3 provides the resistance wire 17 encased within a circular body of any suitable insulation 19 which may be magnesium oxide and the insulated resistance wire is encased within a metallic sheath 21.

As explained above the heat conductive member 1 and the sheath 21 of the tubular resistance element 3 are formed of metals, preferably aluminum, having the same coefficients of expansion so that the rates of expansion and contraction will be the same under thermal variations.

When it is desired to fabricate a unitary structure comprising the heat conductive member and the sheathed tubular resistance element, a length of the heat conductive member is cut from the shape which has been supplied to the fabricator in the shape shown in Fig. 2 and a sheathed tubular resistance element 3 cut to a length substantially the same as that of member 1 is inserted in channel 13 which is formed by curved portion 9 and flanges 11. It will be understood that the curved portion 9 of member 1 is dimensionally such that the element 3 will be snugly received therein. When the tubular element is inserted in the channel as described above the flanges 11 are rolled about the element 3 into the position 12 illustrated in Fig. 3. This action of rolling flanges 11 about the element binds the element in the slot or channel of the heat conductive member providing a sturdy unitary structure endowed with the attributes necessary to a heating and heat dissipating unit. It will be recognized, of course, that the wire 17 is connected to an electric power source in any suitable and conventional manner.

It will be noted that the fins 5 and 7 of the heat con-

ductive member extend from the center section in different planes which are on opposite sides of the heating element 3. Due to this construction the air flowing in channels D and E will sweep across at least one surface of both fins.

Since the metal of the heat conductive member 1 and its parts are formed of a metal having the same coefficient of expansion as the metal of the sheath 21 these two parts will have the same rate of expansion and binding and resulting noises will be eliminated.

In Fig. 1 of the drawings I have illustrated one arrangement whereby the unit composed of member 1 and element 3 may be satisfactorily incorporated in a baseboard or other generally similar type of space heater.

The assembly may include a mounting member designated generally by the numeral 23, this member is fabricated to provide a base 25 having an upturned lip 27 along the front edge thereof. From the rear edge of the base a body or backing member 29 extends and at its top edge a forward extending top flange 31 is provided having a downturned lip 33 along its forward edge.

I may provide an inclined plate 35 which is fixed to upturned lip 27 in any suitable manner and extends upwardly and rearwardly therefrom for fixing in any suitable manner to backing member 29 as at 37.

The assembly includes a baffle member 39 provided at its top edge with a forwardly and upwardly extending baffle flange 41 and at its lower edge with a forwardly and downwardly extending baffle flange 43, the baffle 39 being spaced from mounting member 29 providing an air or convection duct A therebetween, the flange baffle 41 being spaced from flange 31 and lip 33 providing an air or convection duct B therebetween and the flange baffle 43 being spaced from plate 35 providing an air or convection duct C therebetween. The ducts A, B and C are in communication with each other.

I provide a forward baffle 45 which is spaced from baffle 39 and its baffle flanges, and I position the heating unit composed of heat conductive member 1 and resistance element 3 between baffles 39 and 45 providing air or convection ducts D and E between these parts of the assembly. Grooved elements 47 may be provided on the outer face of baffle 45, one adjacent the top edge thereof and the other adjacent the bottom edge thereof. I provide a cover plate 49 having lips 51 formed along its top and bottom edges adapted to hook into the grooved elements 47 to support the cover plate in position. The cover plate is outwardly bulged to space it from forward baffle 45 forming an air space F between these two components of the assembly. Screws 53 or any other suitable means may extend through the assembly in order to maintain the parts thereof in the described relative positions.

It will now be appreciated that the major convection currents D and E cause air to flow over and in contact with the heating units, including the fins which extend substantial distances through the currents D and E. It will be further appreciated that A, B and C also carry air warmed by baffle 39. At the top of all the ducts the currents of heated air are directed forwardly away from the wall which assures clean operation of the heater. The cover plate 49 may be touched and will not be hot enough to burn because of the air pocket F therebehind.

It will now be evident that I have devised an efficient and easily produced heater element and a space heater incorporating the heater element which is of compact proportions and is endowed with excellent heat producing qualities.

I claim:

An electric space heater including, in combination, a mounting member, spaced apart elongated front and rear baffles supported from said mounting member providing an air flow channel therebetween, an elongated metallic heat conductive and heat dissipating member supported from said mounting member in said channel in spaced relation with respect to said front and rear baffles, said

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heat conductive and heat dissipating member comprising an upper heat conductive and dissipating fin and a lower heat conductive and dissipating fin, a section being provided between and connecting said fins and having a longitudinally extending groove formed therein, a tubular heating element including a resistance element encased within a metallic sheath and positioned within said groove in substantially continuous thermal engagement with the wall thereof, a continuous flange formed on each side of said groove integral with said section and rolled over said tubular heating element and in substantially continuous thermal engagement therewith for transfer of heat from the former to the latter and to the heat conductive and heat dissipating member, and the metals from which said heat conductive and heat dissipating member and said metallic sheath are formed have substantially the same coefficients of expansion, and the entire lower fin extending in a plane on one side of the axial plane of said tubular heating element and the entire upper fin extending in a plane on the other side of the axial plane of said tubular heating element, whereby the air flowing through said channel is heated by said heat conductive and heat dissipating member and said tubular

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heating element, and said section provides minimum restriction to flow of air over said heat conductive and heat dissipating member.

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