Sept. 30, 1969 D. McKAY ET AL 3,470,352

ELECTRIC HEATER

Filed June 12, 1967

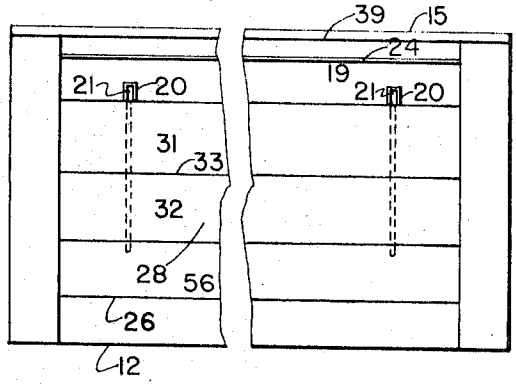

FIG. 1

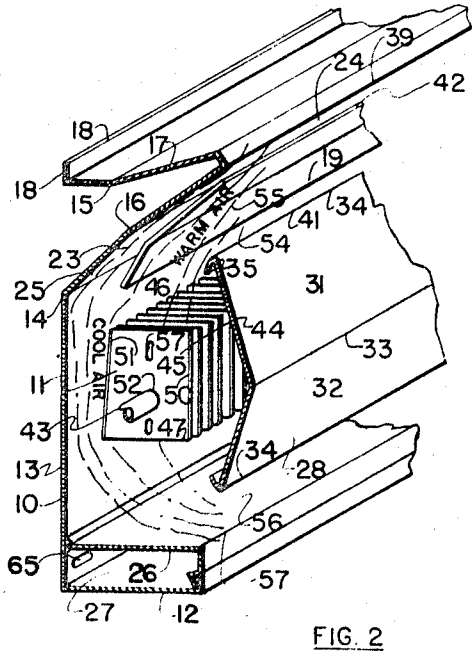

FIG. 2

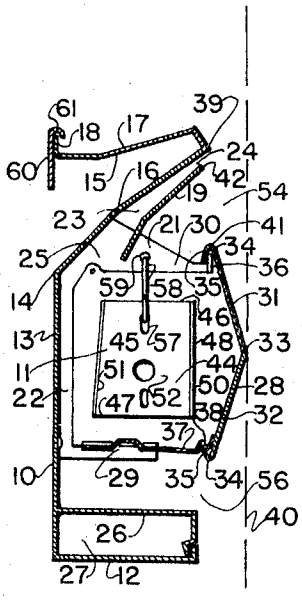

FIG. 3

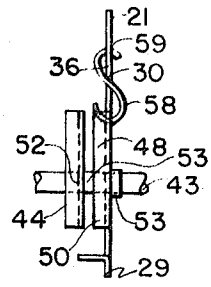

FIG. 4

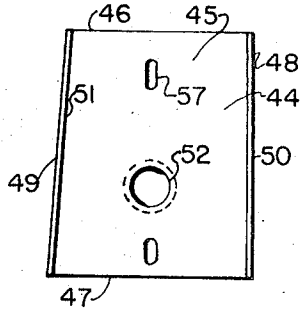

FIG. 6

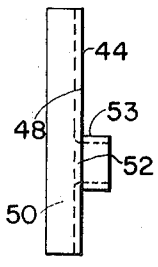

FIG. 7

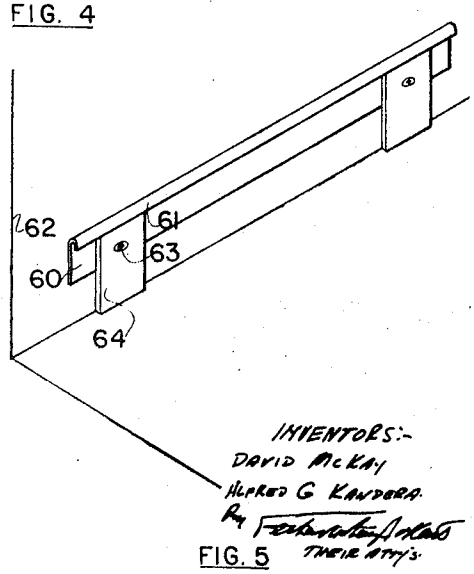

FIG. 5

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ELECTRIC HEATER

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Int. Cl. H05b 3/62
U.S. Cl. 219—368 2 Claims

ABSTRACT OF THE DISCLOSURE

A baseboard heater consisting of a casing having a forwardly and upwardly sloping upper wall which then folds back upon itself to provide an air space between the two portions. A deflector is spaced from the upwardly and forwardly inclining portion thus defining air channels one of which draws cool air adjacent the casing and the other of which directs the flow of warm air flowing from the heater element. It also includes a front baffle which is shaped so that it is impossible to block off the air flow from the heater by furniture or the like. Fins located on a heating element have their rear edges slanted forwardly towards the bottom of the deflector.

This invention relates to new and useful improvements in electric heaters, particularly electric baseboard heaters.

Although the present invention is directed primarily towards baseboard heaters, nevertheless it should be understood that such heaters can be manufactured as portable units as well as baseboard heaters.

Conventional baseboard heaters have several disadvantages, among which is a tendency for the heaters to streak the walls with dirt due to the air flow characteristics of said heaters.

These characteristics also induce relatively high temperatures on the walls and on the baseboard heater casing and these high temperatures in turn lead to expansion noises and air circulation which is vulnerable to blockage by furniture and other items.

The present invention overcomes all of these disadvantages by providing a casing which includes a forwardly and upwardly sloping upper wall which then folds back upon itself thus providing an air space between the two portions. A deflector is spaced from the upwardly and forwardly inclining portion thus defining air channels one of which draws cool air adjacent the casing and the other which directs the flow of warm air flowing from the heater element.

It also includes a front baffle which is shaped so that it is impossible to block off the air flow from the heater by furniture or the like, and the heater element includes a novel design of baffles for directing the warm air in the desired air flow patterns.

The design of the heater is relatively simple and ensures a cool casing, cool walls, and no streaking from the air flow striking the walls.

The design is adaptable for use as a baseboard heater or, alternatively, as a portable unit.

The installation is such that expansion noises are eliminated inasmuch as there is room for expansion and contraction within limits.

It is found that two factors contribute primarily to wall streaking. Firstly, a high convector temperature tends

to carbonize lint and other minute particles in the air and deposit them along the walls. Secondly, poor case and convector design allows hot air to flow along the case top back to the wall thereby increasing the deposit of air contaminants thereon.

The present device overcomes these disadvantages as it is specifically designed to exhaust the air away from the wall and to keep those surfaces in the convector which come in contact with the moving air, below 490° F.

This has been achieved by combining a particularly novel case profile with a unique fin design. The position of the top edge of the front baffle with regard to the upper boundary of the exhaust opening influences the air flow pattern and the fin design, in combination with the baffle and deflector portions, eliminate the necessity for extensive baffling systems normally used in an endeavor to keep the casing cool.

With the foregoing in view, and such other objects, purposes or advantages as may become apparent from consideration of this disclosure and specification, the present invention consists of the inventive concept in whatsoever way the same may be embodied having regard to the particular exemplification or exemplifications of same herein, with due regard in this connection being had to the accompanying figures in which:

FIGURE 1 is a front view of the heater.

FIGURE 2 is an isometric sectional view of the heater.

FIGURE 3 is an end section of the heater showing the installation under the mounting strip.

FIGURE 4 is a front detail showing the support of the heater element.

FIGURE 5 is an isometric view of the mounting strip.

FIGURE 6 is a side elevation of one of the convector fins in a scale larger than the remaining drawings.

FIGURE 7 is an end view of FIGURE 6.

In the drawings like characters of reference indicate corresponding parts in the different figures.

Proceeding, therefore, to describe the invention in detail, reference character **10** illustrates the casing generally having the heater element assembly collectively designated **11** therein.

In detail, the casing includes a base panel **12** and a rear panel **13** extending upwardly therefrom.

Formed integrally with the rear panel and extending from the upper edge **14** thereof is an upper wall collectively designated **15**. This upper wall includes what is defined as an inner portion **16** and an outer portion **17**.

The inner portion angulates forwardly and upwardly from the upper edge **14** and is then bent back upon itself to form the outer portion **17**, said outer portion inclining downwardly and rearwardly and terminating in a vertically situated flange **18** so that the inner and outer portions are in spaced apart relationship from one another as clearly shown in the drawings. An angulated deflector **19** is provided in spaced relationship from the inner portion **16**, said deflector being slotted as at **20** to engage over the upper sides **21** of a pair of mounting clips or brackets **22** which will hereinafter be described.

This holds the deflector in the relationship shown in the drawings and the deflector together with the inner portion **16** defines an air channel **23**, the upper sides **24** of which is narrower than the lower side **25**.

The design of the casing is such that a flow of cool air passes through the air channel **23** thus preventing the rear wall **13** and the upper wall **15** of the casing from overheating.

The lower wall 12 of the casing is enclosed by means of enclosing wall 26 thus forming a wiring channel 27 through which wiring may be run for powering the device.

A front baffle collectively designated 28 is provided and reference should be made to FIGURE 3 which shows the mounting clips 22 hereinbefore mentioned.

These clips include the lower horizontal leg 29 and the upper horizontal leg 30. The baffle 28 includes an upper portion 31 and a lower portion 32 both inclining outwardly to a common apex 33. The upper and lower edges 34 are angulated to form engaging flanges 35. The upper horizontal leg 30 is provided with an upwardly extending flange 36 over which flange 35 engages and the lower leg 29 supports an outwardly extending resilient clip 37 angulated as at 28 and over which lower flange 35 engages in a resilient manner thus clipping the baffle into position.

It will be noted that the apex 33 extends forwardly of the junction 39 between the upper and lower portions 16 and 17 thus ensuring that air flow space is left even if furniture is pushed up against the heater as indicated by the dotted line 40 in FIGURE 3. Also of importance is to note the position of the upper edge 41 of the baffle 28 with relation to the upper edge 42 of the deflector 19, and the aforementioned junction line 39. This upper edge 41 should be substantially vertically below these two points thus ensuring the desired forward deflection of the hot air well clear of the wall surface.

The heater element assembly 11 consists of an elongated cylindrical heater element 43 of conventional construction which is connected to a source of electrical energy in the conventional manner, the necessary thermostatic control device being incorporated. However, as these are conventional, it is not believed necessary to describe same.

Secured to and surrounding the heater element 43 is a plurality of convector fins 44 and shown in detail in FIGURES 6 and 7.

These fins are manufactured from sheet metal and include a substantially planar portion 45 having an upper edge 46, lower edge 47, front edge 48 and rear edge 49.

The front edge 48 is angulated at right angles to form a right angled flange 50 and this flange is substantially at 90° to the lower edge 47.

The rear edge 49 is also angulated in the same direction to form a flange 51 but due to the fact that the upper edge 46 is shorter than the lower edge 47 this flange inclines upwardly and forwardly from the lower edge 47 towards the upper edge 46 all of which is clearly shown in FIGURE 6.

An aperture 52 is extruded through the planar portion 45, substantially centrally between flanges 50 and 51 and this extruded aperture forms a sleeve portion 53 by which the individual fins are engaged over the tubular heating element 43 so that the portions 53 act as spacers to maintain the individual fins in spaced and parallel relationship one from the other.

The angulated flanges 50 and 51 not only increase the heat dissipation surface area but also assist in shielding off the heat radiation from the element, to the front baffle 28 thus preventing this baffle from overheating.

The inclination of the rear flanges 49 directs warm air forwardly through the air channel 54 defined by the aforementioned deflector 19 and the upper edge 41 of the front baffle 28 and this hot air flow is indicated by the lines 55 in FIG. 2.

Air, of course, is drawn in through the air intake channel 56 defined by the lower edge 34 of the baffle and the edge 57 of the base and it will be noted that the cool air entering through this channel 56 divides, part of it passing upwardly behind the heater element assembly 11 and through channel 23 and the remainder passing upwardly through the heater element thus picking up heat and being discharged as warm air through the channel 54.

Also of note are the apertures 57 formed adjacent the upper edges 46 of the individual fins thus enabling an S-hook 58 or the like to engage through convenient apertures and also to engage through apertures 59 within the upper horizontal leg 21 of the supporting bracket 22.

FIGURE 5 shows the novel mounting strip for mounting the heater against the baseboard or other area.

It consists of an elongated planar portion 60 with a forwardly and downwardly curved upper edge 61. This is secured to the supporting wall 62 by means of screws 63, conventional templates 64 being provided for positioning purposes.

The upwardly extending flange 18 formed on the outer portion 17 of the upper wall 15, engages under this curved edge 61 whereupon the heater is pushed backwardly against the baseboard or wall 62, the formation of the upper wall 15 providing sufficient flexing of the outer portion 17 to permit this to occur. The casing may then be secured by screws to the wall, said screws passing through elongated slots 65 in the rear wall 13 of the casing. This mounting provides longitudinal expansion movement during heating and cooling, thus eliminating stress and the subsequent conventional noises usually associated with such construction.

It has been found that the conventional limit control capillary is best situated within the air channel 24. The forwardly inclined flanged edges 51 of the convector fins is a slightly longer rear edge thus giving the rising air along this edge, a higher temperature rise. This ensures a higher air velocity at this point which, together with the friction between the various layers of the air stream, gives it a bending effect and thereby a smoother flow through the air channel 54.

These slanted flanges also guide the rising warm air away from the limit control capillary under normal operation. However, even the slightest back pressures caused by obstructions in front of the case, cause a rerouting of the hot air flow towards the back and an almost immediate response of the temperature limit control thus giving a safer and cooler heater.

Various modifications can be made within the scope of the inventive concept disclosed. Accordingly, it is intended that what is described herein should be regarded as illustrative of such concept and not for the purpose of limiting protection to any particular embodiment thereof, but that only such limitations should be placed upon the scope of protection to which the inventors hereof are entitled, as justice dictates.

What we claim as our invention is:

1. In a heater unit of the character described, the combination of a casing having an open front and including a rear wall and an upwardly and forwardly extending upper wall portion, brackets provided at longitudinally spaced points on the rear wall of the casing and including vertically spaced upper and lower legs projecting forwardly from said rear wall, an elongated heating element supported between the upper and lower legs of said brackets, a plurality of spaced vertical fins provided on said heating element, said fins having forwardly slanting rear edges and forwardly slanting laterally directed flanges at said rear edges, a front baffle mounted on the upper and lower legs of said brackets forwardly of said heating element with its upper edge spaced below the front edge of said upper wall portion, and an upwardly and forwardly slanted deflector supported by the upper legs of said brackets in spaced relation between said upper wall portion and the upper edge of said baffle with the front edge of said deflector and the front edge of said upper wall portion and the upper edge of the baffle being in substantial vertical alignment, said forwardly slanting flanges at the rear edges of said heating element fins being directed toward the rear lower edge of said deflector, whereby heated air may flow from said heating element through the space between the deflector and the upper edge of said baffle and whereby relatively cool air may flow from the bottom of said casing behind the heating element and through the space between the deflector and said upper wall portion

to provide a cool air curtain rearwardly of the heated air flow.

2. The device as defined in claim 1 wherein said heating element fins have vertical front edges and laterally directed flanges thereon, said flanges on the front edges of said fins being spaced rearwardly from the upper edge of said baffle.

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U.S. Cl. X.R.

219—365, 367, 540