March 30, 1948. B. SPIETH 2,438,767

HEATING ELEMENT AND SUPPORT THEREFOR

Filed July 1, 1944

Fig. 1.

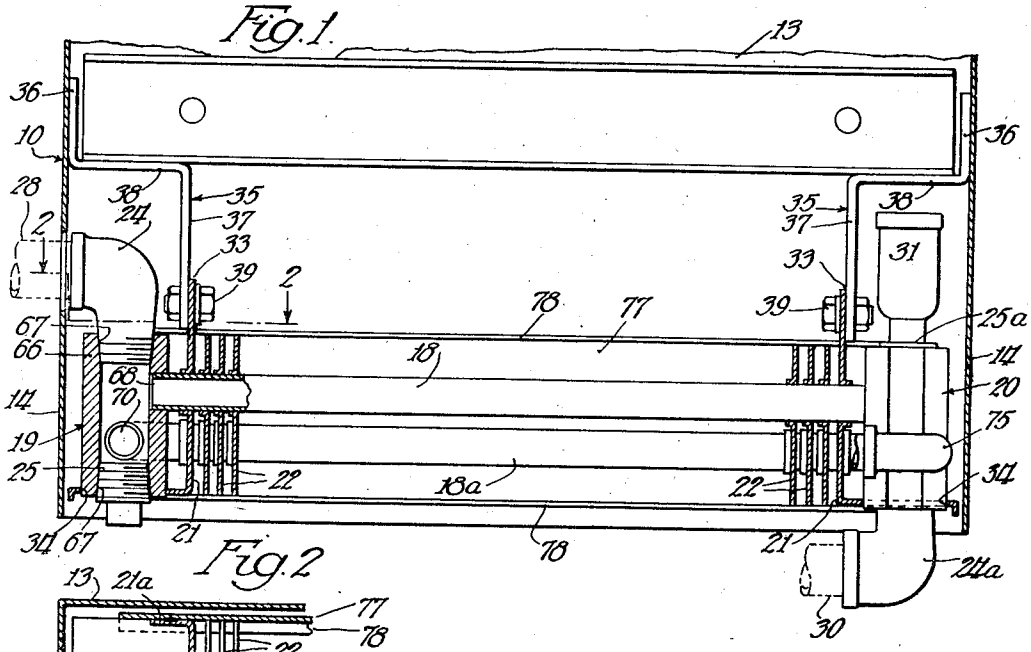



Fig. 2

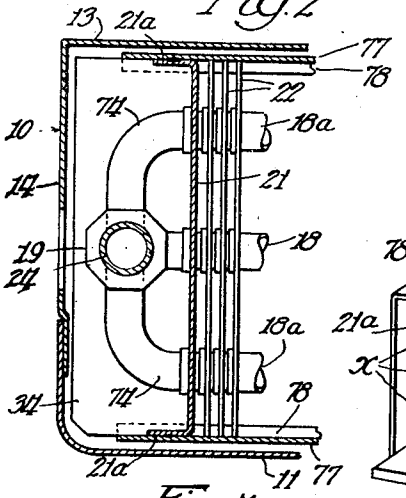



Fig. 3

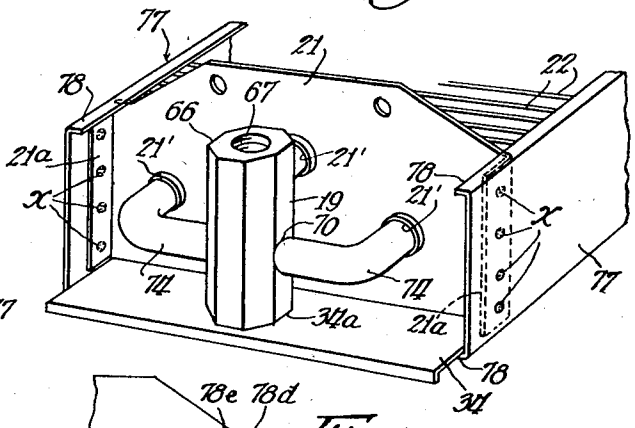



Fig. 4

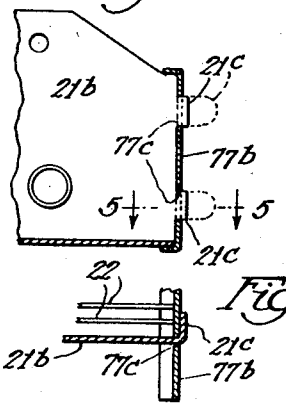
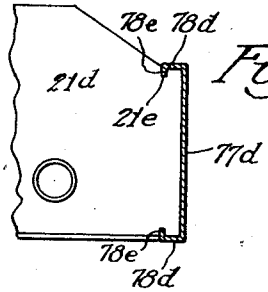



Fig. 5




Fig. 6




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## HEATING ELEMENT AND SUPPORT THEREFOR

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Application July 1, 1944, Serial No. 543,117

5 Claims. (Cl. 257—136)

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This invention relates to heating elements and supports therefor, and more particularly, it relates to heating elements for convection heaters, where economy in the cost of manufacture and a minimum of number of fabricated parts are of importance.

The subject matter of this application is a continuation in part of my application for patent on Heating element, filed September 2, 1943, under Serial No. 500,876.

Heating elements of the character employed in convection heaters and other heaters employ fluid conducting tubes connected to headers, one of which is connected to a steam or hot water supply pipe. When a two-pipe system is employed, each header is connected to a pipe, one to a supply pipe and the other to the return pipe.

Due to the nature of the heating element, it is usually constructed of light gage and comparatively expensive materials, such as copper and brass. Therefore, in order to provide strength and sufficient rigidity to resist external piping strains, it is necessary to build as rigid a construction as possible while, at the same time, maintain production economies. To this end I have devised a form of sheet metal bracket for use at the ends of the heating element which performs several functions.

One object of the present invention is the provision of novel sheet metal supporting brackets for a heating element composed of headers connected to tubes with fins strung along the same, said brackets also serving to steady and give added support to the headers.

Another object is the provision of a heating element as above set forth with side plates extending between the brackets and rigidly secured thereto.

Another object is the provision of a heating element and support therefor as above set forth which can be constructed economically, is easily assembled and capable of being readily installed in a cabinet.

With these and other objects and advantages in view, this invention consists in the several novel features hereinafter fully described and claimed.

One embodiment of the invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a view of the heating element and support therefor showing its application to a convection heater cabinet (partly broken away), the view being partially in front elevation and partially in vertical longitudinal section;

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Fig. 2 is a fragmental horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmental perspective view of the heating element and support therefor;

Fig. 4 is a fragmental view of a certain supporting bracket and side plate, partly in end elevation and partly in vertical section showing a modified form of connection between the supporting bracket and side plate;

Fig. 5 is a fragmental horizontal section taken on the line 5—5 of Fig. 4; and

Fig. 6 is a view similar to Fig. 4 illustrating another form of connection between the supporting bracket and side plate.

Referring to said drawings, and first to Figs. 1 to 3 inclusive, the reference character 10 designates a cabinet in which air is heated by passing upward through the heating element and is discharged into the room or other space in which the heater is located.

The cabinet may be open at its lower end for the admission of air, and a damper controlled auxiliary air inlet (not shown) may be provided in a wall of the cabinet above the heating element whereby the temperature of the outgoing air may be regulated. An air discharge opening is employed in the top of the cabinet. The cabinet may be supported above the floor as by bolting or otherwise fastening it to a wall of the room in which it is contained.

A fuller description of a convection heater cabinet in which the present heating element may be used will be found in my co-pending application for letters patent on Convection heaters, Serial No. 500,877, filed September 2, 1943, now Patent No. 2,406,643 issued August 27, 1946.

Spot welded or otherwise rigidly secured to the side walls 14—14 of the cabinet and extending from one front wall 11 to the rear wall 13 thereof, are bracket members 35 desirably composed of sheet metal, each bent up to provide a vertical flange 36 for securement to the adjacent side wall 14, a horizontal portion 38 and an inwardly spaced depending portion 37. To the depending portions 37 of the bracket members are rigidly secured upright members 33 of angle or L-shaped fins or plates 21—21 which serve as supporting brackets, as by bolts and nuts 39 or the like, and the horizontal flanges 34 of said supporting brackets are formed with holes, 34a—each for the reception of the lower end of one of said headers designated generally by the reference characters 19—20. The headers fit in the holes in the horizontal flanges 34 and, as a result, are

given added support. The center lines of the headers are substantially parallel with the air flow through the heating element.

The header 19 is located at the inlet end of the heating element and the header 20 is located at the discharge end thereof. In general, both headers are similar in construction and a description of one will suffice for both.

Each header comprises a short length of tubing, preferably seamless tubing 66, desirably of octagonal, hexagonal or other many sided external configuration adapted to be readily grasped by a mechanic's wrench. The ends of the header tube are made square and the bore or cavity in the tube is cylindrical and of such a diameter that its ends need only to be tapped to provide screw threads 67 for the reception of a pipe fitting 24 or 24a or a screw plug 25 or 25a, or any other threaded member that may be required for use in connection with the heating element. The pipe fitting 24, associated with the header 19, may be connected in the usual manner to a steam or hot water supply pipe 28, and the screw plug 25 closes the lower end of the header. In a two-pipe system, an elbow 24a is screwed into the lower end of the threaded bore in the header 20 and is connected with a return pipe 30. In a single pipe system, the supply pipe is connected to one of the headers, whose upper end is closed by a screw plug, and the upper and lower ends of the other header are closed by screw plugs. When an air valve 31 is required, it may be attached to the upper end of the header tube 20 when used in connection with a two-pipe system, or it may be connected with the header at the end of the heating element which is opposite the inlet-outlet, when used in connection with a single pipe system.

Fluid conducting tubes 18—18a extend between and connect the two headers. In the present embodiment of the invention, three tubes are shown in Figs. 1 and 2, the middle one, designated by the character 18, being disposed at a higher level than the tubes 18a and extending in a straight line between the two headers. The tubes 18a, throughout the greater portion of their length, are straight and parallel with the middle tube. On the straight portions of the tubes are secured heat radiating fins 22 and the supporting brackets 21 which also act as fins.

The sides of each header tube are drilled to provide holes at the places where the tubes 18—18a connect with them, as is indicated at 68 and 70. The holes 68 for the middle straight tube 18 are drilled in from the straight sides of the header tubes which face each other, and the holes 70 for the adjacent ends of the tubes 18a may be drilled in the sides of each header tube that extend at right angles of the axis of the holes 68 and at a lower level. At one end of the heating element the end portions of the tubes 18a are bent along arcuate lines to provide elbows 74, the extremities of which are inserted into the holes 70 of the header tube 19. Separate elbows 75 may be provided to connect the other ends of the tubes 18a with the other header tube as shown. It is to be understood that the seamless header tubes, the fluid conducting tubes and the fins are brazed together or otherwise integrally united in accordance with the common practice.

Separate elbows 75 are provided at one of the ends of the tubes 18a to permit the fins to be slipped upon the tubes in assembling the heating element.

In the preferred embodiment of the invention, the ends of the supporting brackets 21 are formed



with flanges 21a, to which are rigidly secured side plates 77 which extend along the ends of the fins 22 and are formed with inturned flanges 78 that project over the edge portions of the fins and supporting members. The side plates 77 and supporting brackets 21 provide a box-like enclosure for the sides and ends of the tube and fin assembly. The tubes extend through flanged openings 21' in the supporting brackets, and may be metallically bonded thereto, thus obtaining a firm, vibrationless connection with the heating elements. In accordance with the preferred form illustrated, the side plates 77 are spot welded to the flanges 21a as shown at X, thus forming a totally rigid structure of light weight and economical in production.

The holes 34a in the flanges 34 of the supporting brackets are of the same configuration as the headers, preferably non-circular, thus preventing rotation of the headers when pipes or other fittings are being screwed into the headers, thereby preventing injury to the light gage tubes. The flanges 34 also serve as baffles to prevent the passage of air upward at the ends of the heating element.

In the modified form of the invention illustrated in Figs. 4 and 5, the connection between the supporting bracket 21b and side plate 77b is formed by ears 21c on the ends of the supporting bracket, which ears extend through slots 77c in the side plate, and are bent over after assembly to provide a rigid structure.

In the modified form illustrated in Fig. 6, the supporting bracket 21d is notched adjacent its ends as at 21e, and the side plate 77d is formed with top and bottom flanges 78d that have inturned edge portions 78e which engage in the notches 21e. Similar notches may be formed in the end portions of the fins and the side plates may be slid into place and anchored full length. If desired, they may be spot welded or otherwise rigidly secured to the supporting brackets.

While I have shown and described the preferred form of header used, it is to be understood that other types of headers may be employed and, therefore, I do not wish to limit myself to the specific header shown.

From the above description, it is apparent that a strong, sturdy and rigid support is provided for the weaker tubes and fins, that the parts are easily assembled and may be readily installed in a cabinet.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A heating element and support therefor comprising, in combination, headers whose center lines are substantially parallel to the air flow through the element, fluid carrying tubes extending from header to header, fins traversing said tubes, flanged supporting brackets through which the fluid carrying tubes extend, the flanges of the supporting brackets having holes therein to receive an end of each header, and flanged side plates extending along the ends of the fins with their flanges projecting over the top and bottom edges of the fins.

2. A heating element and support therefor

comprising, in combination, headers whose center lines are substantially parallel to the air flow through the element, fluid carrying tubes extending from header to header, fins traversing said tubes, flanged supporting brackets through which the fluid carrying tubes extend, the flanges of the supporting brackets having holes therein to receive an end of each header, and flanged side plates extending along the ends of the fins, with their flanges projecting over the top and bottom edges of the fins, said flanges terminating in inturned edges that are received in notches in the top and bottom edges of the fins.

3. A heating element and support therefor comprising spaced tubular many sided headers, a plurality of fluid conducting tubes connecting said headers, a multiplicity of heat radiating fins and a pair of supporting brackets secured upon said tubes, said brackets having horizontally extending flanges each formed with a hole of the same size and shape as the headers in cross section to receive the lower end of a header, and oppositely disposed bracket members adapted to be rigidly secured to walls of a cabinet and having offset downwardly depending portions secured to said supporting brackets and forming the support for the heating element.

4. A heating element and support therefor comprising, in combination, headers whose center lines are substantially parallel to the air flow through the element, fluid carrying tubes extending from header to header, fins traversing said tubes, flanged supporting brackets through which the fluid carrying tubes extend, the flange of each supporting bracket having a hole therein to receive an end of a header, and side plates extending along the edges of the fins, and rigidly secured to said supporting brackets.



5. A heating element and support therefor comprising, in combination, headers whose center lines are substantially parallel to the air flow through the element, fluid carrying tubes extending from header to header, fins traversing said tubes, flanged supporting brackets through which the fluid carrying tubes extend, the flange of each supporting bracket having a hole therein to receive an end of a header, said supporting brackets having vertical flanges at their ends, and flanged side plates extending along the ends of the fins with their flanges projecting over the top and bottom edges of the fins, said side plates being rigidly secured to said vertical flanges of the supporting brackets.

BENJAMIN SPIETH.

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