July 9, 1929. W. LANGENSIEPEN 1,720,334

ELECTRIC HEATER

Filed March 30, 1927

Fig. 1.

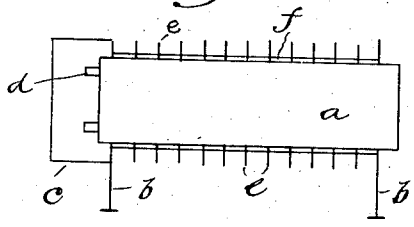


Fig. 2.

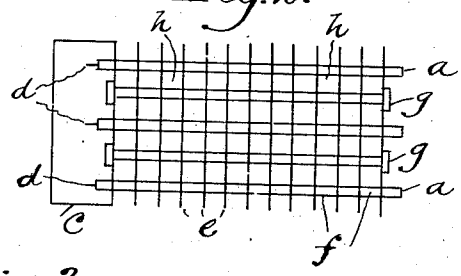


Fig. 3.

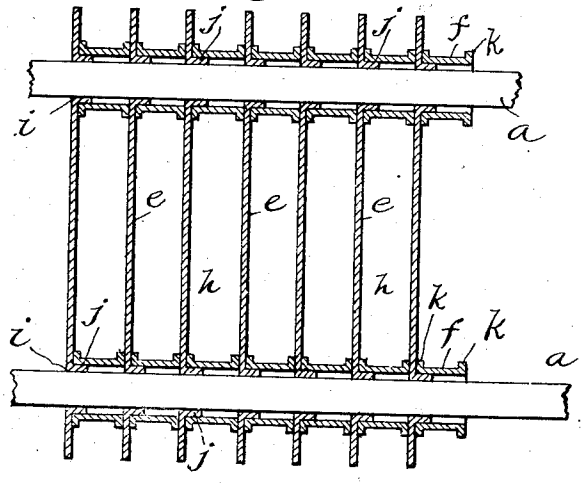


Fig. 4.

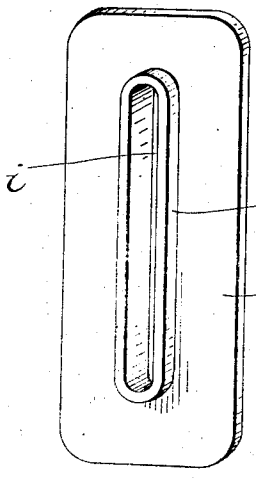


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

Application filed March 30, 1927, Serial No. 179,484, and in Germany March 31, 1926.

This invention relates to improvements in heaters, particularly electric heaters, in which the heating elements extend longitudinally through a series of heat radiating fins. In heaters of this general type, the bar like heating elements are usually pressed into metallic tubes which are corrugated to form fins or they are pressed into a series of castings having fins. Both of these types of construction have the disadvantage of a too great heat capacity, resulting in a considerable delay in bringing the heater up to the desired temperature after the energy is turned on and resulting also in a similar delay in returning the heater to room temperature after the energy is turned off. The tubular fins and the cast fins, particularly the latter, are also of heavy weight. Furthermore, both types referred to have surfaces of considerable extent upon which dust may settle and total radiating surfaces of such small extent that rather high temperatures must be maintained, which condition brings about the generation of odors due to the burning of the dust.

One of the objects of the invention is the provision of means of overcoming the above objections.

One object is the provision of a construction formed largely of metal stampings which shall be low in cost and highly satisfactory in operation.

Other objects, and objects relating to details of construction and economies of manufacture, will appear as I proceed with the description of that embodiment of the invention which, for the purpose of the present application, I have illustrated in the accompanying drawings in which:

Fig. 1 is a diagrammatic view in side elevation of an electric heater embodying the invention;

Fig. 2 is a plan view also in diagrammatic form;

Fig. 3 is a horizontal section through a portion of a heater in which two heating elements are employed;

Fig. 4 is a perspective view of a sheet metal fin formed in accordance with my invention and adapted for use with a single heating element;

Fig. 5 is a perspective view of a tubular spacer used in the invention.

In the drawing the electric heating elements are illustrated at *a*. They are flat, relatively thin elongated members which extend from one end to the other of the heater. Their internal structures form no part of the present invention, but it may be remarked that they are conveniently formed as metal tubes enclosing the usual electric heating coils with terminal wires *d*, as shown in Figs. 1 and 2. The terminals are preferably enclosed in a metal box *c*.

Heat radiating flat sheet metal fins *e*, provided with elongated slots *i* which have flanges *j* on one side of the fin, are pressed onto the heating elements *a* with a tight fit, by which is meant a fit that is as tight as practical considerations in the production of stampings will permit. The flanges *j*, of course, contact closely with the heating elements *a* and thus serve not only to produce a rigid mechanical connection between the heating elements and the fins, but also to produce a good conducting joint for the transference of heat from the heating elements to the fins. In carrying the invention into effect for heaters of various sizes and styles, obviously the fins *e* will have the same number of flanged slots *i* as there are heating elements.

In order to space the fins apart and in order to enclose the heating elements, for a purpose later to appear, I employ flattened tubular spacers *f* having flanges *k* at both ends, these spacers being preferably cut from sheet metal tubing and then flanged at their ends. They are formed of a size to fit snugly upon the flanges *j* of the fins.

In assembling the device a spacer *f* is mounted upon each flange *j* and the fins *e* are then pressed onto the heating elements *a*. After they are all in place clamping bolts *g* are threaded through aligned openings in the fins and the nuts on the bolts are drawn up so as to bring all of the parts of the fin and spacer construction into close contact and to so maintain them. In this manner a rigid unit is produced and good heat conduction is aided.

In order to provide feet or standards for the heater the end fins *b* may be conveniently formed of sheets somewhat larger than the intermediate fins *e*, as indicated in Fig. 1.

The fins *e* and *b*, extending in vertical planes, present practically no surface for the collection of dust. It is, however, practical to make them of relatively large area so that it is possible for each fin to dissipate a relatively larger amount of heat, and the number of fins used may be consequently

reduced. Since the radiating surface is large in comparison with the mass of metal employed the heat capacity is low. The stiffening effect of the fins makes the heater very stable and eliminates the necessity for a special sheet frame. The advantages mentioned make the heater especially suitable for the requirements of car heating.

In the completed heater the only surfaces of appreciable extent that are susceptible of collecting dust are the upper parts of the spacers *f* which are of small extent as compared with the total radiating surface of the heater. Furthermore, the large amount of radiating surface available radiates the heat rapidly so that no exposed portion of the device becomes very hot under ordinary use, it being noted that the heating element itself is entirely enclosed and separated from the spacers *f* by an air chamber. Consequently, odors resulting from burning dust are practically eliminated.

Adjacent fins *e* and the spacers *f* between them together enclose chimney-like spaces which are marked *h* in the drawing.

I claim as my invention:

1. An electric heater, comprising flattened heating elements arranged side by side and extending longitudinally in parallel vertical planes, sheet metal fins provided with slots by means of which the fins are mounted upon the heating elements in vertical planes transversely thereof, and means for spacing said fins whereby the heater when viewed from above has the appearance of a grid, and whereby the heater comprises a series of chimney-like spaces through which air may circulate.

2. An electric heater, comprising flattened heating elements extending longitudinally in parallel vertical planes, sheet metal fins provided with flanged slots to closely receive said heating elements, and tubular spacers enclosing said heating elements between adjacent fins but spaced from said heating elements.

3. In an electric heater, a longitudinally extending heating element, a series of sheet metal transverse fins provided with openings to receive the said heating element, means for transferring heat by metallic conduction to said fins from said heating element, and tubular spacers between adjacent fins surrounding said heating element but spaced therefrom.

4. In an electric heater, a plurality of longitudinally extending heating elements, a series of sheet metal transverse fins provided with openings to receive the said heating elements with a fit close enough to produce good conduction of heat, tubular spacers between adjacent fins surrounding said heating elements, and a bolt extending through aligned holes in said fins whereby the entire assembly may be drawn up tightly into close contact.

5. An electric heater, comprising parallel heating elements extending longitudinally of the heater, sheet metal fins provided with flanged holes to closely receive said heating elements, and tubular spacers enclosing said heating elements between fins, said spacers fitting closely around the flanges of said flanged holes, whereby they are spaced from said heating elements.

6. In an electric heater, comprising parallel heating elements extending longitudinally of the heater, sheet metal fins provided with flanged holes to closely receive said heating elements, tubular spacers enclosing said heating elements between fins, said spacers fitting closely around the flanges of said flanged holes, said spacers having flanges at each end adapted to rest against the sides of adjacent fins, and means for clamping the parts together.

WILHELM LANGENSIEPEN.