March 30, 1954 P. F. METZ 2,673,889

INSULATING SUPPORT FOR HEATING ELEMENTS

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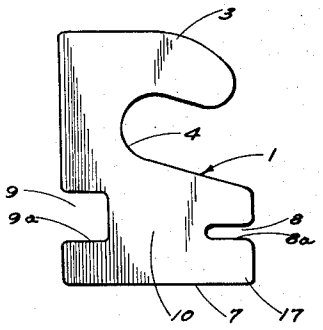


Fig. 1

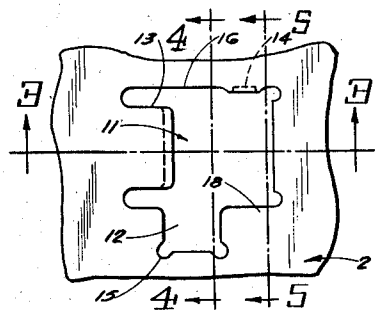


Fig. 2

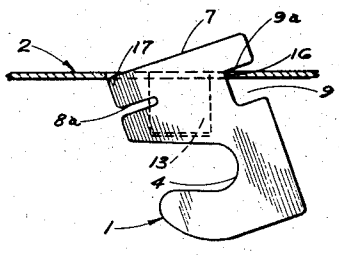


Fig. 4

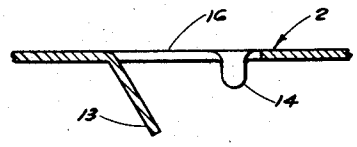


Fig. 3

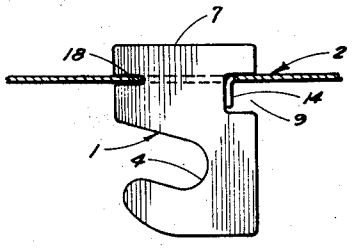


Fig. 5

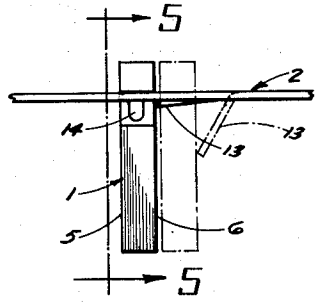


Fig. 6

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INSULATING SUPPORT FOR HEATING ELEMENTS

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5 Claims. (Cl. 174—138)

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The present invention relates to an insulating support for an electric heating element and has particular reference to a ceramic insulating support used to position an electric heating element within an electric range.

It is common practice today among manufacturers of electric ranges to fabricate heating units for inclusion in the oven and broiler spaces of an electric range as removable components. Such a unit may take the form of a flat base plate to which is secured a plurality of ceramic insulating supports by which a helical resistance type heating coil is positioned in a predetermined pattern spaced from the base plate. Thus, broadly speaking, structures of this type are well known in the range art and a wide variety of ceramic supports has been used in such installations with a degree of success.

A well known type of support which is widely used consists simply of a ceramic hook having an enlarged base which engages the margins of a complementary opening formed in the anchor plate. Such supports can only be kept in position relative to the anchor plate by the tension forces exerted on the supports by the heating elements assembled therewith. In other words, the heating element draws the enlarged base of the support against the margins of the hole through which the main body of the support has been passed. This particular type of support has many shortcomings, since no provision is made to assure any particulor orientation with its anchor plate. Furthermore, the supports may be dislodged from the anchor plate should the tension of the heating element vary, which is often the case. In addition, the anchor plate can not be handled with the supports in place prior to the time that the heating element is installed.

Another common type of heating element support that obviates many of the difficulties of the foregoing type consists of a ceramic grommet which is secured to the anchor plate by metal clips or engaging arms. Ceramic grommets when thus assembled to the anchor plate permit handling of the partially completed heating unit prior to the installation of the heating element. However, the heating element is installed by being strung through the plurality of grommets to form the desired heating element pattern. Should one of these grommets break or be defective in any way it is necessary to unstring the heating element to the point where the broken grommet may be disengaged from the element and replaced by a new grommet. This is a

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serious difficulty since the supports, being made of a fragile ceramic material, are often broken during final assembly of the range or during use in the field. The brittleness of the heating element after use also makes replacement difficult. Modifications of this design exist wherein the grommets have ceramic mounting stems which are passed through complementary openings in the anchor plate. This type is also subject to the same shortcomings.

Still another type of prior art support is a ceremic hook having an enlarged base in which is formed a small notch for engaging the margin at one side of a complementary opening provided in the anchor plate for receiving the support. This type is an improvement over the foregoing prior art type although it also has shortcomings, being dependent upon the heating element proper in order to maintain its engagement with the anchor plate. Furthermore, the possibility of assembling the supports to the anchor plate in a variety of positions often leads to confusion.

An important object of the present invention is the provision of a ceramic heating element support which may be assembled in only one position to its base or anchor plate thereby precluding incorrect assembly with the plate. Not only does the present invention preclude improper orientation relative to one face of the anchor plate but it also prevents assembly of the support on the wrong side of the anchor plate. It will be appreciated that this has particular value in mass production operations involving relatively unskilled labor which must be employed to produce ranges at competitive prices.

Another object of the present invention is to provide an insulating support which in normal use is firmly secured to its anchor plate but which may be removed therefrom should any necessity therefor arise. It is noteworthy that an advantage of a heating unit incorporating supports of the type disclosed is that a single insulating support of the plurality secured to the anchor plate may be replaced without disturbing the heating element proper. The importance of this advantage will be appreciated when it is pointed out that heating elements are very brittle after use and difficult to handle without fracture.

It is also an object of the invention to provide a heating element support which, for satisfactory installation with the anchor plate, is totally independent of any tension forces that may be exerted by the heating element when assembled on the supports. The importance of this object will

be readily understood by those skilled in the art since it is well known that the tension of a heating element varies considerably as its temperature varies during use.

A still further advantage of the invention is that it makes possible the assembly of a plurality of heating element supports firmly to an anchor plate without the installation of the heating element proper. Thus, a partially completed heating unit, comprising merely the insulating supports secured to the anchor plate, may be handled without danger of the supports becoming disengaged from the plate. This feature of the invention facilitates handling and storing of partially completed components which is an aid in mass production methods.

The herein disclosed invention avoids all of the shortcomings of the prior art devices and represents a material advance in the heating unit field. The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, with additional objects and advantages thereof will best be understood from the following description of a specific embodiment when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevational view drawn to an enlarged scale showing an improved heating element support made according to the teachings of the present invention;

Fig. 2 is a top plan view of an opening formed in an anchor plate in preparation for the installation of a support;

Fig. 3 is a cross-sectional view taken on plane 3—3 of Fig. 2 showing in cross-section an outstanding anchor tab for securing the support to the anchor plate and also showing in elevation a locating ear which insures proper installation of the support;

Fig. 4 is a sectional view taken along plane 4—4 of Fig. 2 showing a position which the support assumes in the course of its assembly to the anchor plate;

Fig. 5 is a view taken on plane 5—5 of Fig. 6 showing the support in engagement with the locating ear, plane 5—5 also being indicated in Fig. 2 to show its orientation to the opening provided in the anchor plate; and

Fig. 6 shows the position of the support relative to the anchor plate prior to and after the anchor tab is bent from its outstanding position into the plane of the anchor plate.

As shown particularly well in Figs. 1 and 5 the insulating support, generally designated 1, is secured in depending relation to an anchor plate, generally designated 2. Although only one support is shown in the drawings, it should be understood that a plurality may be provided in a predetermined pattern on the anchor plate to define the desired configuration of a conventional resistance type heating element which may take the form of a helical, coiled resistance wire (not shown). The heating element is supported by a hook 3 which forms a coil-receiving throat 4. The throat of the support is usually made slightly larger than the outside diameter of the heating element coils although if desired, it may be made considerably larger than the coils.

It will be obvious to those skilled in the art that, although the supports are described to be depending from the anchor plate, it would be relatively simple to construct a heating unit having the heating element disposed above the anchor plate.

As indicated in Fig. 6, the support is relatively narrow having two parallel side faces 5 and 6, the side faces terminating at a flat base 7 (see Fig. 1). A slot 8 is provided near base 7 on the side of the heating element support in common with the opening of the coil-receiving throat. A rectangular open recess 9 is provided at the other side of the support and has a face 9a which lies in a common plane with face 8a of slot 8 for a purpose to be described more fully hereinafter. The width of the slot, which is considerably less than that of the recess, is slightly greater than the thickness of anchor plate 2 to which the support is to be assembled.

The slot and recess define a region of decreased width, or a root section 10, adjacent the base 7. This root section is surrounded closely on all sides by the anchor plate when the support is in assembled relationship therewith.

An irregular opening, generally designated 11, of generally rectangular shape is provided in anchor plate 2 to receive the insulating support. This opening includes a rectangular extension 12 and is bounded in part by an anchor tab 13, which is formed from material projecting into the opening and which is struck out of the plane of the anchor plate in preparation for the insertion of the support. An up-turned locating ear 14 is also provided at the side of the opening 11 opposite rectangular extension 12 and, as shown in Fig. 3, is disposed on the same side of the anchor plate as anchor tab 13. Re-entrant corners 15 of opening 11 are provided to minimize stress concentrations within the anchor plate that would otherwise be favored if sharp corners were present.

In order to assemble a support to the anchor plate, it is first located so that the flat base 7 forms an acute angle with the plane of the anchor plate as shown in Fig. 4. When the support is in this position, parallel faces 5 and 6 are normal to the plane of the anchor plate and recess 9 is engaged with edge 16 of opening 11 while corner 17 of the support is positioned within extension 12.

After the support is positioned as shown in Fig. 4, it is subjected to a pure rotation until slot 8 is in position to engage the anchor plate and recess 9 is in position to engage upturned locating ear 14. Thereafter the support is subjected to a pure translation in a direction normal to its side faces and is moved from the phantom line position to the full line position shown in Fig. At the end of this movement slot 8 of the support is engaged with margin 18 of opening 11 and recess 9 is engaged with ear 14 with faces 8a and 9a resting on the upper face of the anchor plate.

Assembly of the support to the anchor plate is completed when anchor tab 13 is bent from the phantom line position to the full line position shown in Fig. 6. This displacement of the anchor tab firmly secures the support at the plane of its root section to the anchor plate in a particular depending relationship therewith. Should it be necessary for any reason to remove or replace the support, this may be done merely by bending the anchor tab out of the plane of the anchor plate and reversing the steps which have been outlined in describing the mode of assembly.

It should be noted that when assembled to the anchor plate, the support has a particular orientation therewith, not only being disposed on a certain side of the plate but also having a certain position relative to that side which is deter-

mined by the formation of opening 11 and locating ear 14 in the plate. It will be readily apparent from the drawing that the support must be placed on a certain side of the anchor plate because, when in assembled relationship therewith, coplanar faces 8a and 9a must embrace a common plane face of the anchor plate. Furthermore, although the support is positioned on the right side of the anchor plate, it cannot be rotated and inserted backwards in its receiving opening because ear 14 must be engaged by recess 9, the ear being much too large to fit within slot 8.

Since improper orientation of the support relative to the anchor plate is precluded, it will be understood that the use of the present invention aids in eliminating errors in the assembly of heating units for electric ranges or similar devices. It will also be obvious from the foregoing that the supports are firmly secured in the anchor plate after the anchor tabs are bent into the plane of the plate. The locked engagement of the supports makes possible the handling of the assembly regardless of whether or not the heating element is engaged in the hooks of the supports, since engagement of the supports with the anchor plate is totally independent of any force exerted by the heating element coils.

The insulating supports may be formed from any suitable refractory material such as commonly used for electrical insulators. The anchor plate may be made from a wide variety of materials but preferably is formed from a piece of soft, low-carbon steel to facilitate the bending of tab 13 and ear 14. Protective surface treatments may be applied to the anchor plate, if desired.

Whereas the present invention has been described with particular reference to electric ranges, it should be understood that it may be applied with equal utility and advantage to any structure in which an electric heating element must be supported adjacent a support member.

Having described a preferred embodiment of my invention, I claim:

1. A heating unit component for use in mounting a helical coil heating element within an electric range or the like, comprising an insulating support formed to define an open throat for receiving the heating element, said support having remote from the throat a base portion adjacent which is formed a slot and opposite the slot an enlarged recess defining a root section of said support therebetween, an anchor plate formed to define a support-receiving opening, said opening having a portion of sufficient width to permit the passage of the base of said support therethrough when the recess is engaged with said anchor plate adjacent one edge of the opening, the opening also including a section adjacent to but smaller than the first portion and slightly larger than the root of said support, said section having adjacent one side thereof a locating ear stuck out of the plane of the anchor plate for engagement with the recess, said root being positioned within the section when said support is assembled with said anchor plate with the ear in engagement with the recess, an anchor tab formed integrally with said anchor plate adjacent the first portion of the opening for securing said support to said anchor plate when disposed in a common plane therewith in position obstructing the first portion of the opening.

2. In a heating unit a ceramic insulating support, an anchor plate formed to define an opening for receiving said support, a locating ear formed integrally with said anchor plate adjacent the opening, said support being formed to define a slot for assembled engagement with the edge of the opening and a recess for assembled engagement with the locating ear, and an anchor tab formed integrally with said anchor plate for securing said support within the opening when said anchor tab is disposed within the plane of said anchor plate.

3. In a heating unit, a ceramic insulating support, an anchor plate formed to define an opening for receiving said support, means formed integrally with said anchor plate for locating said support relative to said plate by engagement with a complementary recess formed in said support, and means formed integrally with said anchor plate to lock said support within the anchor plate opening when the second named means is disposed in the plane of said anchor plate.

4. In a heating unit, an insulating support including a base section, a plate formed to define an opening for receiving said base section, said plate having a projection adjacent the opening therein, said base section being formed to define a recess in a side face thereof for cooperative engagement with said projection, said opening being larger than said base section adjacent the recess whereby said support may be inserted through said opening and shifted in a direction parallel to the face of said plate until the recess is in engagement with said projection, and bendable means formed integrally with said plate for partially blocking said opening and preventing movement of said support relative to said plate after said support has been shifted into engagement with said projection.

5. In a heating unit, an insulating support including a base section, a plate formed to define an opening for receiving said base section, said base section being formed to define a recess for cooperative engagement with said plate adjacent the opening, said opening being larger than said base section adjacent the recess whereby said support may be inserted through said opening and shifted in a direction parallel to the face of said plate until the recess is in engagement with said plate, and bendable means integrally formed with said plate for partially blocking said opening and preventing movement of said support relative to said plate after said support has been shifted into engagement with said plate.

PAUL FRANCIS METZ.

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