April 23, 1929. J. H. SIMON 1,710,196

ELECTRIC HEATER UNIT

Filed Jan. 11, 1928

Fig. 1.

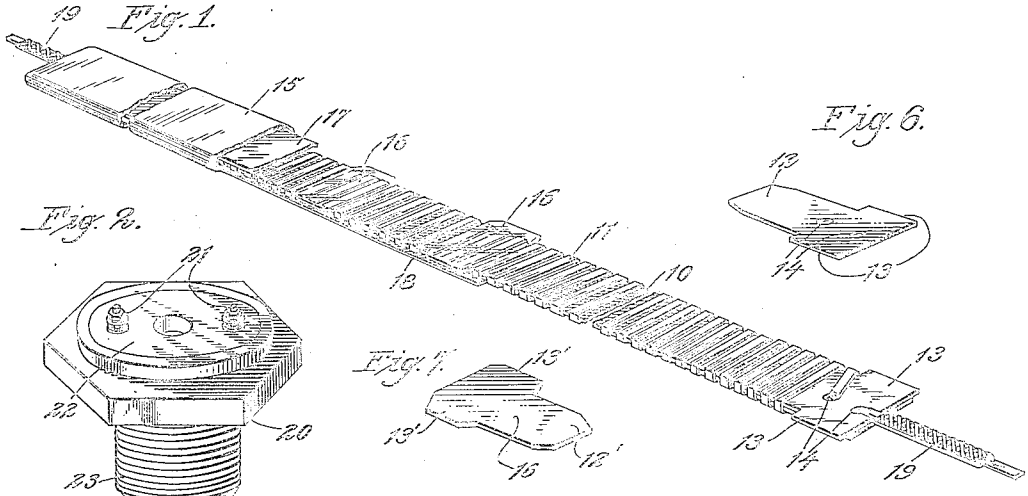


Fig. 6.

Fig. 2.

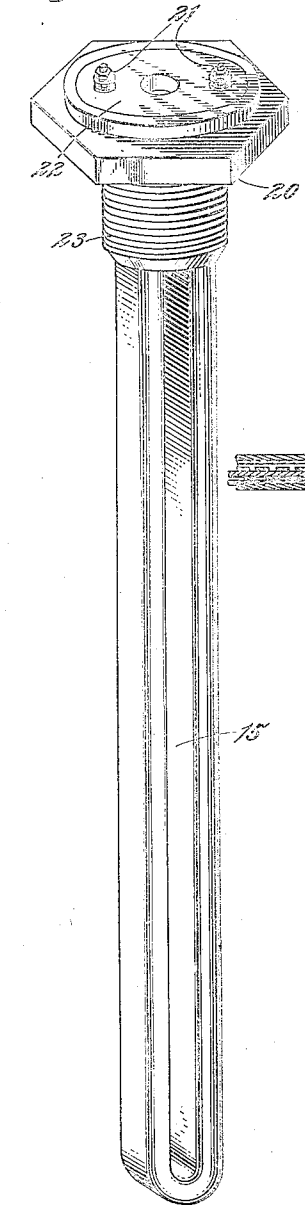


Fig. 7.

Fig. 3.

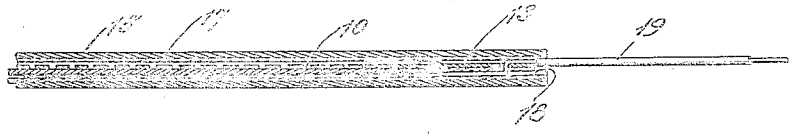


Fig. 4.

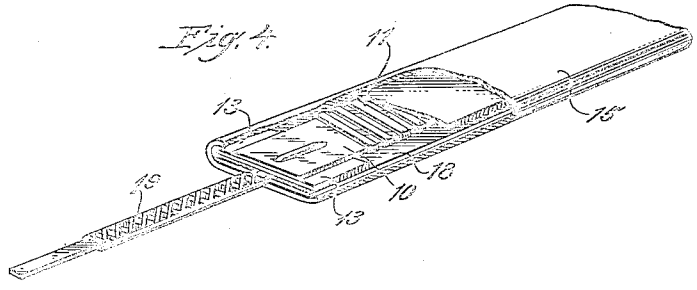
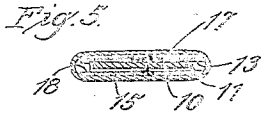


Fig. 5.



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Patented Apr. 23, 1929. 1,710,196

UNITED STATES PATENT OFFICE.

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ELECTRIC-HEATER UNIT.

Application filed January 11, 1928. Serial No. 245,376.

My present invention relates to an improved form of electric heater and more particularly to heater units of the type provided with an enclosing sheathing.

An object of my invention is to provide a heating unit of the above type which will be practical, durable and easy to manufacture.

A further object of my invention is to provide a novel means for spacing the heater unit centrally of the sheath so that the danger of a short circuit or grounding thereof will be reduced to a minimum.

In the prior art devices it is customary to wrap the heater unit in a suitable insulating member so as to totally enclose the same before it is assembled in its sheathing element. A modified embodiment of this practice is illustrated in the patent to Hulbert, No. 1,427,596. This patent suggests a core or winding support of asbestos and channel shaped strips preferably of mica which, by reason of their shape, completely surround the heater winding. I have found that such a structure is very difficult to manufacture because of the tendency of the mica to break and chip in forming it to such a channel shape and, in fact, where a heater element is to be produced which is relatively thin, it is practically impossible to crimp the mica so as to cover the edges of the winding. I therefore propose to solve this problem by omitting the feature of crimping the edges of the mica insulation, as disclosed in this patent, and provide other means which I have found to be more practical and simple and which also facilitates the assembly of such units.

For a better understanding of my invention reference should be had to the accompanying drawing, in which—

Fig. 1 is a perspective view with parts broken away to expose the various elements of my invention,

Fig. 2 is a perspective view of an assembled heater unit embodying my invention,

Fig. 3 is a fragmentary sectional view of a portion of my heater unit,

Fig. 4 is a fragmentary perspective view showing the end construction of my unit,

Fig. 5 is a transverse sectional view through my element,

Fig. 6 is a perspective view of a suitable member for use at the ends of a unit in accordance with my invention, and

Fig. 7 is a perspective view of the intermediate heater winding centralizing or spacing members.

In the drawing 10 designates a suitable heat resisting core upon which is helically wound a suitable resistance conductor 11. The resistance conductor 11 is wound directly upon the core 10 and where a flat ribbon conductor, as illustrated, is used, no means will be found necessary to space the convolutions thereof as the stiffness of the conductor itself will be sufficient to maintain them in the position to which they are bent in winding. At the ends of the core member 10 I provide a spacing member having a tongue 12 and oppositely projecting shoulders 13. The tongue 12 of this member is inserted under the end turns of the heater winding and when it is properly positioned with respect thereto I lace the end of the resistance conductor through the holes 14 which have been previously provided. This arrangement provides a very effective means which prevents the winding 11 from becoming displaced upon the core and the shoulders 13 also provide a spacing means for centralizing the ends of the winding within its enclosing sheathing, which sheathing I have designated in the drawing by the numeral 15. These end spacing members are provided at each end of the unit and where the unit is relatively short the end spacing members will be found sufficient to maintain the heater winding centrally of its sheath 15, but where the unit is of any considerable length or where it is proposed to bend them into the so-called hairpin units, as is illustrated in Fig. 2, I have found it advisable to provide other spacing units 16. These units 16 have a tongue 12′ and shoulders 13′. Where these additional spacing members are necessary they will be spaced at various points along the unit by passing the tongue 12′ beneath several turns of the winding 11 where they

will be securely held against lateral displacement since the tongue 12′ has a width substantially equal to that of the core. In the event that the unit is to be bent to a hairpin shape as previously suggested, it will be found desirable to locate these intermediate spacing units adjacent each side of the bend.

After the winding 11 has been wound upon the core and the spacing units above referred to have been properly placed in position, I assemble flat strips of mica 17 and 18 which have a width equal to the distance across the shoulder portion of the spacing members and then insert the whole into the sheathing member 15. The sheathing member 15 is of such a dimension that this operation can be easily carried out and after the unit has been properly positioned within the sheath I subject the whole to a pressure sufficient to flatten the sheath 15 into intimate contact with the parts therein. After the unit has been thus assembled I have found that it can be bent and twisted to various configurations without fear of grounding the winding upon the sheathing 15. I have also found that a very sharp bend, such as is illustrated in Fig. 2, can be produced without making previous provisions therefor as is illustrated in the above mentioned Hulbert patent wherein he provides a notch 12 and omits a number of turns of the winding. This feature is considered to be of great advantage as it simplifies the winding of the cores since no special attention may be given the winding at any point throughout its length. In Figs. 1, 3, and 4 I have shown the ends of the winding 11 as provided with a member 19. This member 19 is a short piece of metallic tubing which has been pressed into intimate contact with the conductor 11 so as to provide a suitable terminal thereon.

In the assembled unit as illustrated in Fig. 2 the ends of the sheathing 15 are welded securely to a plug cap 20 and the terminals 19 are brought up through the cap to terminals 21 which are carried by an insulating plate 22. The plug cap 20 is provided with screw threads 23 which are adapted to engage a similar threaded opening in a container adapted to hold a liquid which it is desired to heat. The heater unit in this case is commonly known as of the immersion type. It is to be understood, however, that my invention is not necessarily limited to immersion type of heaters, but is broadly applicable to any heater unit having an outer sheathing.

While I have shown the preferred form of my invention as now known to me, it is to be understood that various changes may be made in its construction without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. An electrical heating element including a core of heat resisting material, a resistance conductor wound on said core in spaced convolutions, insulation extending longitudinally along the flat sides of said resistance conductor winding and projecting outwardly beyond the edges thereof, a flattened tube fitting over and extending from end to end of said insulation and winding, and spacing means adapted to be inserted in spaced relation under the convolutions of said resistant conductor and project outwardly therefrom intermediate its length to space said core and winding centrally of said insulation and said flattened tube.

2. An electrical heating element including a flat core of heat resisting insulating material, a resistance conductor wound on said core in spaced convolutions, insulating strips extending longitudinally along the flat sides of said resistance conductor winding and projecting beyond the edges thereof, a flattened tube fitting over and extending from end to end of said strips and winding, and spacing members having a tongue adapted to be inserted under the convolutions of said resistance conductor and shoulders extending outwardly from said tongue projecting beyond the resistance conductor and spacing said core and winding centrally of said flat insulating strips when within said flattened tube.

3. An electrical heating element including a core member of uniform dimensions throughout its length of heat resisting insulating material, a resistance conductor formed in spaced convolutions upon said core, insulating strips of uniform dimensions extending longitudinally along the flat sides of said resistance conductor winding, said strips being of a width greater than that of the core member and projecting beyond the winding carried thereby, a flattened tube extending from end to end of said strips for encasing said winding, spacing members arranged at spaced intervals throughout the length of said winding having a tongue projecting under convolutions of said winding and shoulders projecting edgewise outwardly therefrom and engaging said flattened tube at its longest axis to thereby maintain said winding centrally of said tube.

4. An electrical heating element including a flat core member of uniform dimensions throughout its length of heat resisting insulating material, a resistance conductor wound on said core member in spaced convolutions, a T-shaped member having a tongue adapted to be inserted under the end turns of said winding and shoulders thereon which project edgewise beyond said winding, and means whereby the same is secured to said core member to thereby retain said winding

upon said core and provide a spacing means therefor substantially as described.

5. An electrical heating element including a flat core member of uniform dimensions throughout its length of heat resisting insulating material, a resistance conductor wound on said core member in spaced convolutions, a T-shaped member having a tongue adapted to be inserted under the end turns of said winding and shoulders thereon which project edgewise beyond said winding, said T-shaped member and said core member having perforations through which said resistance conductor is laced to thereby secure said T-shaped member to said core and thus prevent displacement of said winding upon said core.

JOSEPH H. SIMON.