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A. D. KEENE

1,624,345

HEATING UNIT TERMINAL

Filed March 26, 1925

Fig. 1.

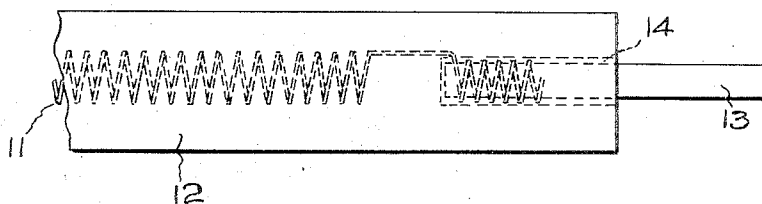


Fig. 2.

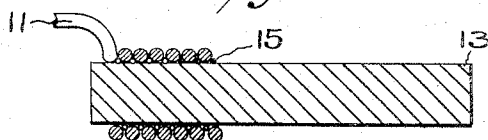
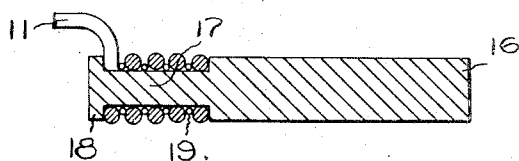


Fig. 3.



WITNESSES:

R. S. Harrison
H. M. Bichel

INVENTOR

Alvin D. Keene

BY

Herbert E. Carr
ATTORNEY

UNITED STATES PATENT OFFICE.

ALVIN D. KEENE, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

HEATING-UNIT TERMINAL.

Application filed March 26, 1925. Serial No. 18,424.

My invention relates to electric heating units and particularly to terminal members therefor.

An object of my invention is to provide a relatively simple and easily manufactured terminal member for an embedded heating unit.

In practicing my invention, I provide a resistor member, of substantially non-oxidizable material, that has its end portion wrapped around the end of a rod or bar of non-oxidizable material, a wire of iron or steel being interposed between the adjacent turns of the resistor wire on the rod.

In the single sheet of drawings,

Figure 1 is a fragmentary view, in side elevation, of a device embodying my invention,

Fig. 2 is a view in longitudinal section through a device embodying my invention, and

Fig. 3 is a view, in longitudinal section, through a modified form of device embodying my invention.

An improved terminal device embodying my invention is particularly applicable to, and may be effectively used with, an embedded heating element of the kind disclosed and claimed in my copending application, Serial No. 18,425; filed March 26, 1925 which is assigned to the Westinghouse Electric & Mfg. Company.

The heating unit comprises a resistor wire 11 of any suitable or desired size and length that is preferably wound into substantially helical form. If a heating unit of substantially rectangular form is to be made, the helically wound resistor member 11 is so shaped as to provide a plurality of substantially parallel-extending, spaced, straight convolutions, the entire length of the resistor wire is covered with a layer of initially-moistened, comminuted material, such as alundum, which is permitted to dry thereon. The formed and insulated resistor wire is then embedded in a mass of heat-and-electric conducting comminuted material, such as carborundum, which is tightly compressed to form a flat heating unit.

If a heating unit of rod form is to be constructed, the resistor member 11 need not be insulated with a layer of electric-insulating material, and is simply embedded in a mass 12 of heat and electric conducting material, such as carborundum, that is

initially in moistened and comminuted form and that may have mixed therewith a small quantity of clay that acts as a binder. The mass 12 of carborundum is tightly compressed around the resistor wire and the end of a terminal bar, 13, that projects into the mass 12, substantially as illustrated in Fig. 1 of the drawing.

The bar or rod 13, which may be of circular or of rectangular shape in lateral section, has the end of the resistor wire 11 wound therearound a predetermined number of times and is covered with a layer of initially moistened comminuted electric-insulating material, such as alundum. A relatively small iron or steel wire 15 is also wrapped around the inner end of the rod or bar 13 substantially as illustrated in Fig. 2 of the drawing. The wire 11, which is usually of nichrome, may be wrapped tightly around the inner end of the rod 13, together with the interposed wire 15 and the turns will be held tightly against the bar 13, in substantially the position illustrated in Fig. 2 of the drawing, particularly when the mass 12 of silicon carbide, commonly known as carborundum, has been compressed at relatively high pressures around the resistor member and the terminal member.

In order to thoroughly dry out the mass 12, it is necessary to heat the same to a relatively high temperature and the initial subjection of the wire 15, which is made of steel or iron, to heat, causes a change in the crystalline structure thereof, and an accompanying transformation thereof into an oxide which is a very good conductor of electricity. Simultaneously with the change in crystalline structure and the transformation into an oxide, the wire 15 swells or increases in lateral area and, generally, in volume, thereby effecting a wedging action between the outer surface of the bar 13 and that part of the turns of the wire 11 directly operatively engaged by the wire 15, and providing a good electrical contact and current-conducting portion therebetween.

As the wire 11 and the rod 13 are of nichrome, which is of relatively non-oxidizable material relatively little change, if any, will take place during this heating or during the heating that is effected by operating such a heating unit.

Fig. 3 illustrates a modified form of ter-

5 minal member in which a rod or bar 16 is provided with a reduced inner portion 17 having an end shoulder portion 18, the wire 11 being wound a predetermined number of times around the reduced portion between the two shoulders provided thereby.

10 A wire 19, of iron or steel, is wound between the turns, which are here shown as slightly spaced from one another and substantially the same action, or change in crystalline structure, and a transformation into a conducting oxide and a wedging action, is effected upon the initial heating of the device.

15 As the transformed wire members 15 and 19 do not lose their originally acquired greater volume, the wedging action is a continuous one and, if anything, is improved in the course of repeated heating by reason of the normal operation of the device.

20 Various modifications and changes may be made without departing from the spirit and scope of the invention, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:

30 1. A terminal member for an electric heating element having a substantially non-oxidizable wire, comprising a substantially non-oxidizable member, having a plurality of turns of the substantially non-oxidizable wire wrapped therearound, and a plurality of turns of wire of an oxidizable material disposed around said non-oxidizable member intermediate the turns of said substantially non-oxidizable wire.

40 2. A terminal member for an electric heating element having a substantially non-oxidizable wire, comprising a substantially non-oxidizable member having a plurality of turns of the non-oxidizable wire wrapped therearound, and means, operatively engag-

ing said wire and said substantially non-oxidizable member, that expands permanently upon being heated and provides an electric conducting path between the two members. 45

3. A terminal member for an electric heating element having a substantially non-oxidizable wire resistor, comprising an elongated member of substantially non-oxidizable material, said member having a pair of spaced shoulders thereon and a plurality of turns of the resistor wire wrapped therearound between said shoulders, and a plurality of turns of a wire of oxidizable material wound around said elongated member between said shoulders and engaging said wire and said elongated member, said oxidizable wire swelling permanently upon being heated and wedging said turns of resistor wire tightly between said shoulders. 50 55 60

4. A terminal member for an embedded heating element having a resistor wire of substantially non-oxidizable material insulatedly mounted in a layer of compressed heat-and-electric-conducting material, comprising an elongated member, of substantially non-oxidizable material, having a portion extending into said layer of material and having a plurality of turns of the resistor wire wrapped therearound, a plurality of turns of wire of a material that swells permanently upon being heated, wrapped around said elongated member intermediate the turns of the resistor wire, and a coating of powdered, electric-insulating material around the embedded portion of the elongated member and the wire wrappings thereon. 65 70 75 80

In testimony whereof, I have hereunto subscribed my name this 13th day of March, 1925.

ALVIN D. KEENE.