April 28, 1953 R. E. B. WAKEFIELD 2,636,963

RESISTOR TERMINAL CONSTRUCTION

Filed Aug. 16, 1950

FIG. 1

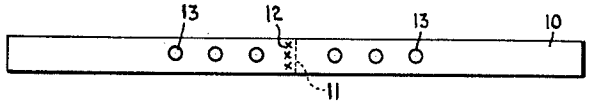


FIG. 2

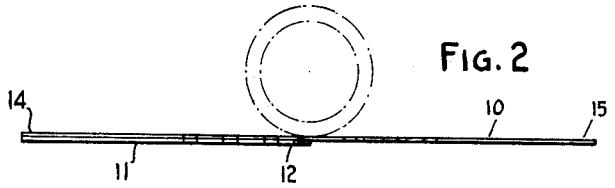


FIG. 3

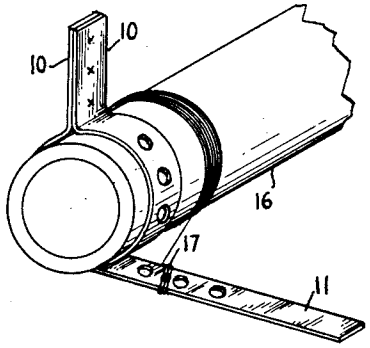


FIG. 4

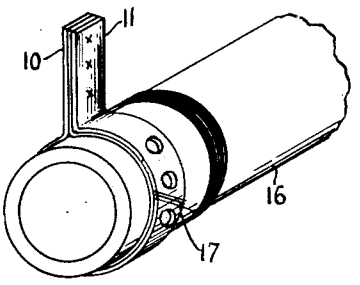
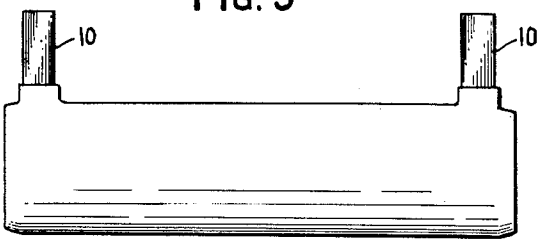


FIG. 5



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2,636,963

RESISTOR TERMINAL CONSTRUCTION

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2 Claims. (Cl. 201—63)

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This invention relates to a method of termination for electrical resistors, and is the terminal construction therefor. The invention is particularly adapted for use with wire wound resistors, and is here illustrated in connection with resistors of the power type impregnated with an insulating coating and baked to form a protective shell over the unit. It will be understood, however, that my invention is not limited to use with such resistors, but may be advantageously used in other types of resistors as well.

In the past, a variety of difficulties have been encountered with the terminals of such resistors. Breakage of the wire where it is connected to the terminal strip occurs, believed to be due to expansion of the terminal strip occurring during the baking, or to differences in the coefficients of expansion of the parts, or to mechanical stressing of the terminal strip when connected into a circuit, and especially where the terminals also constitute the support for the resistor when in use.

Among the objects of this invention are to provide an improved terminal which is free from the difficulties mentioned, which is easily and quickly applied in the process of manufacturing the resistor, which lends itself well to mass production of the resistors, which will protect the fine as well as the heavier resistance wires against damage and possible breakage during manufacture and during service, and which does not require matching of the coefficients of expansion of the core, coating, wire and terminals.

It is another object of this invention to provide an improved method of effecting termination of electrical resistors.

Still other objects and advantages of my invention will be apparent from this specification.

The features of novelty which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention, itself, however, both as to its fundamental principles and as to its particular embodiments, will best be understood by reference to the specification and accompanying drawings, in which:

Figure 1 is a plan view of my improved terminal strip before application to a resistor;

Fig. 2 is an edge view thereof;

Fig. 3 is a perspective view of an end portion of a resistor showing a step in the process of applying my improved terminal thereto;

Fig. 4 is a similar view showing the terminal assembly completed, before the coating is applied to the resistor; and

Fig. 5 is a view of a complete, coated resistor having the terminals applied thereto.

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Referring now more particularly to Figs. 1 and 2, the terminal is preferably formed of a pair of metal strips 10 and 11, of unequal length. The strips are assembled to be co-extensive from one end and may be spot welded together along the line 12, as indicated in Fig. 1. Any suitable metal may be used for the strips, and I have obtained very satisfactory results with #42 nickel steel for both strips.

After spot welding the strips together, or before if desired, the assembly is provided with anchoring means, such as a plurality of holes 13 to permit the coating of the resistor unit to lock through the terminal band to keep the terminal in place. The number, size and location of the holes are chosen as desired for the particular unit.

To apply the terminal, the longer strip 10 is bent around the resistor core 16, usually tubular, so as to clamp the same, and the outwardly extending end portions 14 and 15 are brought together and spot welded to each other. This operation leaves the strip 11 extending more or less tangentially to the band. The end of the resistance wire 17 wound on core 16, is stripped of its insulation, if any, and is wrapped several times around the strip 11 as shown in Fig. 3. The wrapping is desirably made near the point of attachment of strip 11 to strip 10 and the wire is spot welded to the strip 11. This establishes good electrical and mechanical connection between wire 17 and strip 11.

The strip 11 is next bent around the core so as to lie on top of strip 10 whereupon the strips 10 and 11 are secured together, as by spot welding at the outer ends thereof. After completion of this step the terminal has the appearance shown in Fig. 4. This welding of the strip 11 at its ends, the welding of the wrapping of the wire around the strip and the clamping of the turns of the wrapping between the strips 10 and 11, effectively protects the resistance wire, normally the weakest part of the assembly, against strain and breakage.

The resistor unit may then be given a coating of ceramic material, which covers the resistance wire and the terminals except for the outwardly extending portions in Fig. 4, and as shown in Fig. 5. After the ceramic coating is dried and baked, the wire and the connections thereof to the terminals are firmly protected.

A coating which I have found particularly satisfactory for application by dipping is described and claimed in my patent application entitled Resistor, filed concurrently herewith, but any

other suitable coating may be used, or the resistor may be left uncoated. In the process described in that case, the core 16 is of combustible material and is burned out after the first few coatings of ceramic material. Thereupon the resistor is given one or more final coatings of ceramic material and the ceramic material taking the place of core 16 unites with the previously applied coatings, and this applies also to the ceramic material which penetrates the holes 13 to enhance the anchoring effect thereof.

While I prefer to use spot welding for securing the strips together, especially in the case of power resistors, which run hot, the strips might be soldered or otherwise secured under appropriate circumstances.

In the specification, I have explained the principles of my invention and the best mode in which I have contemplated applying those principles, so as to distinguish my invention from other inventions; and I have particularly pointed out and distinctly claimed the part, improvement or combination which I claim as my invention or discovery.

While I have shown and described certain preferred embodiments of my invention, it will be understood that modifications and changes may be made without departing from the spirit and scope thereof, as will be clear to those skilled in the art.

I claim:

1. In a resistor, a core, a resistance wire on said core, and a pair of terminals for said wire, each comprising a first metallic strip the length of which substantially exceeds the circumference

of said core, said strip shaped to said core and having the ends thereof extending outwardly and welded together, and a second metallic strip the length of which is substantially less than that of the first strip, having one end welded to said first strip near the mid point thereof and its other end welded to the extending ends of the first strip, and said wire encircling said second strip at an intermediate point and welded thereto adjacent said mid point connection.

2. The method of providing a terminal on a wire wound resistor which comprises securing one end of a shorter metal strip at a point substantially midway of a metal strip of a length greater than the circumference of the resistor, placing said longer strip circumferentially around the resistor with its ends juxtaposed and extending outwardly, securing said ends together, wrapping the end portion of the resistor wire about said shorter strip and securing the wire to said strip, forming the free end of said strip against the longer strip, and securing the longer and shorter strips together.

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