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W. J. MEANS

1,832,466

RESISTANCE UNIT

Filed Nov. 26, 1927

FIG. 1

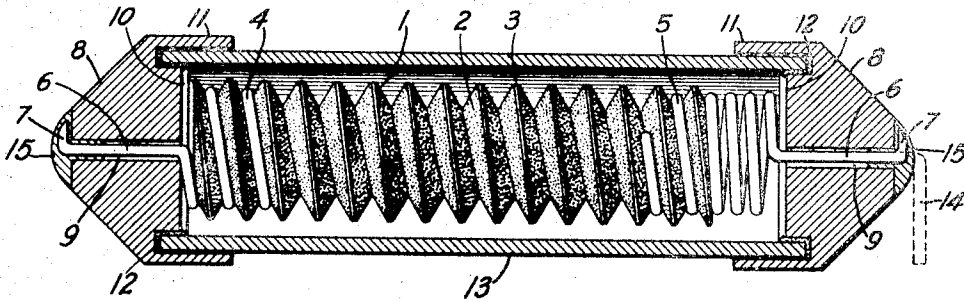
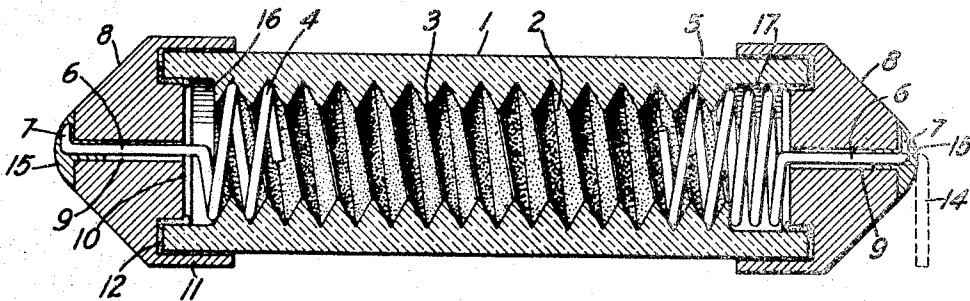


FIG. 2



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RESISTANCE UNIT

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This invention relates to resistance units and to a method of making the same, and more particularly to the type used in leaks and similar current paths and its object is to provide a compact form of device in which a comparatively long conducting path is obtained in a small space.

In accordance with the general features of this invention a rod of suitable insulating material is provided with a tortuous or helical path suitably coated with conducting material. Preferably the conducting path is provided by threading the insulating material, coating the threaded surface with suitable conducting material and turning off the tops or peaks of the threads to expose or bare the surface of the insulating material. Helical springs wound to substantially the same pitch as the threads of the rod engage the bottom of conducting portions of the threads and suitable contacting devices.

As is common with resistance units of this general type the resistance element or coated rod with its helical springs may be enclosed in a suitable tube of insulating material with terminal caps or contacting devices on each end thereof and electrical connection made between the terminal caps and the helical springs.

This invention is also applicable to forming the resistance element by interiorly threading a tube of insulating material, coating the threaded portion with conducting material and removing the conducting material from the peaks or tops of the thread. With the resistance element constructed in this manner the helical springs would be turned into the threaded portion of the base to contact with the conducting material and the terminal caps would be applied to the ends of the tubular base member.

In either case a resistance unit is provided wherein a comparatively long tortuous path of conducting material is obtained in a small space and adjustment of the resistance value of the unit may be made to fairly close limits by turning the helical spring members into or out of the threaded portion of the base member.

To more clearly explain and illustrate this invention reference will now be made to the accompanying drawings in which Fig. 1 is a view in cross section of the first described type wherein an exteriorly threaded insulating base member coated with conducting material in the threaded portions is used and is enclosed in a suitable tube of insulating material, and Fig. 2 is a similar view in cross section of the second described type wherein an interiorly threaded tube of insulating material with conducting material in the threaded portion is used. In the latter embodiment the terminal caps are fitted to the insulating base member and no outer insulating tube or enclosing member is required.

Referring now in detail to Fig. 1, 1 is a base member of insulating material such as unglazed porcelain or any other material having the required insulating properties and having a continuous thread running from end to end, the thread being cut or moulded into the base member whichever is found preferable, 2 is a coating of graphite or like conducting material applied to the threaded portion of the insulating base member 1. This conducting material may be applied to the insulating base member in various ways, for instance, by making a paste of the conducting material and spreading the paste onto the threaded portion of the base, by dipping the base into a solution containing the conducting material or by spraying the base with the solution. The method of applying the conducting material to the base member, however, is not of importance in connection with this invention. 3 represents the thread tops bared of the conducting material to form an unbroken helical path of insulating material from end to end of the threaded base member. This path may be formed by turning or grinding off the thread tops by rubbing the conducting material off this portion of the threads or by any other manner found practicable. 4 and 5 are helical spring members composed preferably of wire wound in a helix of the same pitch as the threaded portion of the base member. These spring members 4 and 5 are turned into the threads of the base member so that a plu-

5 rality of turns of the helical spring will lie within the valley portions of the thread and make good electrical contact with the conducting material therein. Each spring member 4 and 5 has a straight portion 6 terminating in another straight portion 7 extending at right angles to the straight portion 6. 8 and 8 are end or terminal caps of good conducting material illustrated as of a general
 10 frusto-conical shape with a central bore 9 of a slightly larger diameter than the straight portion 6 of the springs 4 or 5. A central boss portion 10 and a surrounding annular portion 11 with a separating annular slot or
 15 groove 12 are provided to receive the end of a tubular casing 13.

A suitable cement or glue may be employed in the groove 12 and along the inner wall surface of the annular portion 11 and the
 20 outer wall of the boss portion 10 to secure the terminal cap 8 to the end of the tubular casing 13.

In forming the helical spring members 4 and 5 one at least of these members is provided with an extended portion of the straight
 25 portion 7 as illustrated at 14 by dotted lines. This extension piece is left on the spring member until after the resistance unit has been assembled and provides means by which
 30 the helical spring may be turned further into or out of the threaded portion of the base member while the resistance unit is under test and by this turning movement adjustment may be readily made of the resistance
 35 value of the unit to fairly close limits. After adjustment has been made of the helical spring members by turning the helical portion further into or out of the threaded portion of the base member solder may be applied as shown at 15 to the flat top portion
 40 of the end cap and the protruding portion 7 of the helical spring member so that some of the solder will flow part way down the central bore 9 of the end cap and secure
 45 the straight portion 6 of the helical spring to the end cap. The end 14 of the helical spring may be severed from the straight portion 7 after the spring has been secured to the end cap.

50 In Fig. 2 most of the parts correspond to those shown in Fig. 1 and need no further description and explanation. The difference, however, is in the insulating base member 1, which as here shown is an interiorly
 55 threaded tubular member of insulating material with countersunk portions 16 and 17 at the ends and the internal thread extending unbroken from one countersunk end portion to the other. The countersunk end
 60 portion 17 is shown as being of greater depth than the countersunk end portion 16. This, however, is not necessary as both could be made of the same depth providing room was allowed for adjustment of the helical spring
 65 members 4 and 5 or at least one of them by

turning further into or out of the threaded base member.

It will be apparent that numerous changes and modifications may be made in the structure disclosed and method of producing with-
 70 out departing from the spirit of the invention, defined in the following claims.

What is claimed is:

1. A resistance unit comprising a threaded base member of insulating material, a coating
 75 of conducting material on the thread, the thread top bared of the conducting material to create a long helical path of conducting material, and caps for the unit, helical spring
 80 members connecting the conducting material on the thread and the end caps, one at least of said helical spring members having an angularly extending end portion for turning the helical spring within the threaded base to
 85 adjust the resistance unit to a predetermined value after said unit has been assembled.

2. A resistance unit comprising a threaded insulating base member coated with conducting material with the thread top bared on the conducting material to form a helical path
 90 of conducting material extending from end to end of the base member, end caps of conducting material and helical spring members engaging the conducting material and the end caps, said end caps being longitudinally
 95 bored, straight portions on said helical spring members extending longitudinally of said base member, and through the end caps, and terminating in angularly disposed portions to serve as means for adjusting the resistance
 100 unit to a predetermined value after said unit has been assembled.

In witness whereof, I hereunto subscribe my name this 22d day of November, A. D. 1927.

WINTHROP J. MEANS.

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