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2,597,338

RESISTANCE

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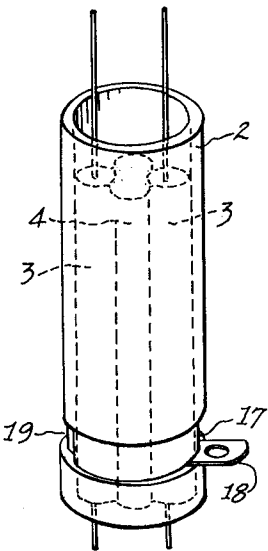


Fig. 1

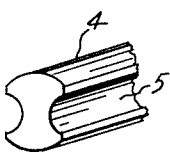


Fig. 2



Fig. 3

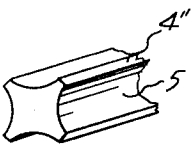


Fig. 4

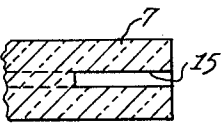


Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11

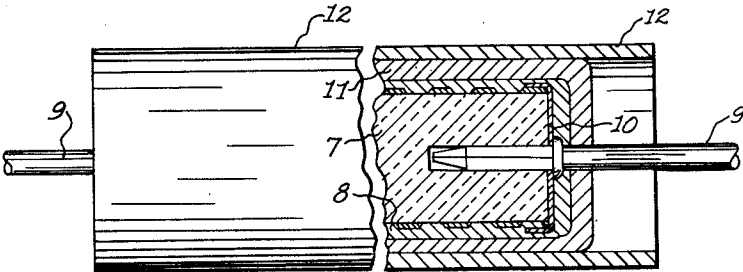


Fig. 5

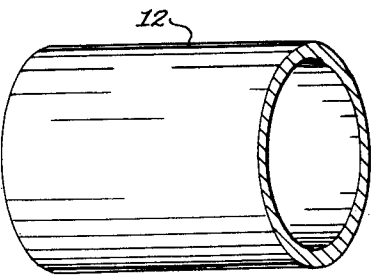
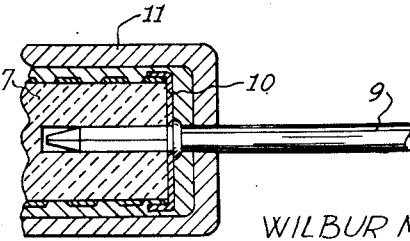


Fig. 6



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RESISTANCE

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3 Claims. (Cl. 201-67)

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Electrical resistances in some cases are crowded into very close spaces and close to metal. Where such a resistor is subject to high duty or to overloads, there is not only a problem of adequate insulation, but also a problem of adequate heat dissipation, as well as general protection against mechanical injuries. In the present invention, a construction may be had which is particularly well protected in the various respects desirable, and which withal is amenable to precision mass production and with reasonable costs. Other objects and advantages will appear from the following description.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a perspective view, somewhat enlarged, of a resistor installation in accordance with the invention;

Fig. 2 is a fragmentary perspective view of an insert as in such device;

Figs. 3 and 4 are similar views of modified forms of insert;

Fig. 5 is a part side elevational and part sectional view, on a large scale, of the resistance cartridge;

Fig. 6 is a part elevational and part sectional view showing the detail of certain elements of structure;

Fig. 7 is a fragmentary sectional view of the core shown in Figs. 5 and 6; and

Figs. 8, 9 and 10 are fragmentary perspective views of terminals for insertion therein; and

Fig. 11 is a reduced scale fragmentary perspective view of an insulating sleeve.

Referring to the drawing more particularly, there is shown in Fig. 1 a complete assembly involving a cylindrical ceramic shell 2 as an overall casing, within which resistance cartridges 3 are provided, these being spaced apart by an insert-spacer 4, Fig. 2, which is a ceramic bar with parallel grooves 5. This insert-spacer, together with the cartridges 3 is assembled within the ceramic shell 2, suitable ceramic cement, sodium silicate, or like adhesive, being applied to such limited extent as necessary for securing the assembly together. Where more than two resistance cartridges are required or where an air-conducting

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bore additionally is desired, the insert-spacers may take the form of plural groovings as for instance in Figs. 3 and 4, in any case the number of grooves being such as desired for the number of resistance cartridges or ventilating air ducts. The detail structure of resistance cartridge involves a core or ceramic body 7 on which is a resistance element 8, in the particular form illustrated this being in spiral convolutions of hard carbon as cut in a coating formed in situ. And connecting the end of the resistance element to the terminal 9 is a metal layer 10 which may be from an applied metal coated on or may be a pressed-on end cover. This assures firm union with both resistance element and terminal. A casing or cover 11 of insulating plastic as desired, silicone resin, phenol-formaldehyde, urea-formaldehyde resins, etc., is molded onto and over the resistance and core such as to completely envelop and protect. As the plastic casing must be applied under considerable pressure in the molding-on operation, it is preferable to first coat the resistance and core with a setting insulating liquid coating C. This may be of material as known, such as silicone resin of thin composition, alkyd resin composition, etc. This may be applied by dipping or spraying, and sets rapidly, as by evaporation of solvent, and on then subjecting the so preliminarily coated article to the pressure of the plastic molding-on operation, there is no risk of damaging or displacing the convolutions of the resistance element. Desirably, a flexible sleeve 12 is then slid over the plastic casing 11, such sleeve protecting and facilitating handling of the resistor as so made up. The flexible sleeve, of tubular character may be of suitable synthetic resin, as polychlorvinyl resins and the like, and in some instances paper, with or without impregnation of synthetic resin. Where paper is employed, an advantage is that such sleeves may be initially in flattened or compressed form, as shown at Fig. 11, and when expanded to circular section they then exert a spring-grip and hold especially firmly as slid onto a resistor unit. As illustrated in Fig. 5, thus the sleeve envelops the enclosed encased resistance and affords protection about the end portions. Where desired, the sleeve may be removed before placing the cartridge inside of the shell 2 or before completing the last of the soldering connections.

The ceramic core 7, as well as the other elements of the structure, may be of sizes appropriate to the resistance rating desired in any given instance, and the cores may have a central bore, or at least at each end an open bore 15 molded

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or drilled, and within which the terminal 9 is axially driven or pressed, to hold by surface deformation. Thus, the terminal as of tinned copper may be of non-circular cross-section, for instance squared as in Fig. 8, or triangular in section as in Fig. 9, or with transverse or circular fins as in Fig. 10, or of other desired form which is non-circular, whereby on being axially driven into the bore there is sufficient deformation in the contacting surfaces to seize and hold. Desirably, the entering end of the terminal is tapered to a smaller diameter, to facilitate entry.

With the elements assembled, the resistance cartridge and spacing insert in the ceramic shell 2, the terminals of the resistance cartridges may be connected in such manner as desired, series, parallel, etc. To mount the ceramic shell 2, a metal clamp 17 may be applied. Preferably, this may take the form of a band having a perforated ear 18, Fig. 1, such band being compressed into position about the shell. If the shell 2 be provided preliminarily with a groove 19, the mounting band or clamp 17 is held in especially firm engagement by the perforated ear or lug 18, the whole may then be fastened in desired location.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In resistor construction, a resistance unit having a core, frangible insulating material with end openings, a resistance element carried by said core, terminals for said resistance element held in said end openings by drive-fit contacting surface deformation, an insulating coating over said resistance element, and a molded on casing thereover, means for holding and protecting said resistance unit including a hollow ceramic shell and a separately formed insulating insert therein, the insert dividing off a longitudinal space for a resistance unit and at least one other similar

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longitudinal space, and means for protecting the surfaces of the resistance unit from abrasions including a flexible, yieldable sleeve slid thereon.

2. In resistor construction, a resistance unit providing a resistance element, terminals for said resistance element held in end openings by drive-set contacting surface deformation, an insulating coating over said resistance element, a molded on casing thereover, means for holding and protecting said resistance unit including a hollow ceramic shell and a separately formed insulating insert therein, the insert dividing off a longitudinal space for a resistance unit and at least one other similar longitudinal space, and means for protecting the surfaces of said resistance unit from abrasions including a flexible, yieldable sleeve slid thereon.

3. In resistor construction, a frangible insulating body carrying spiral turns of resistance on its periphery, an opening circular in cross-section in each end of said body, a terminal with non-circular cross-section held in each said opening by drive-fit contacting surface deformation, and means connecting said resistance to said terminal.

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