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RESISTOR STRUCTURE
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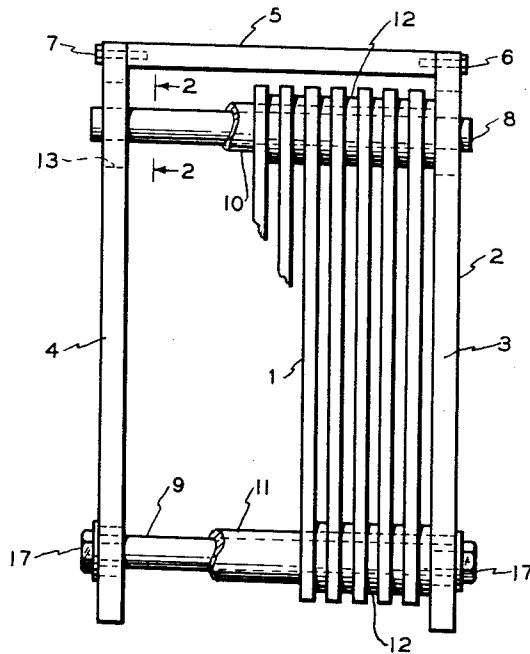


Fig. 1

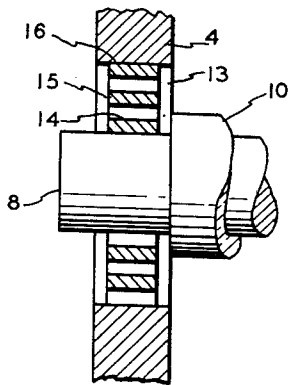


Fig. 3

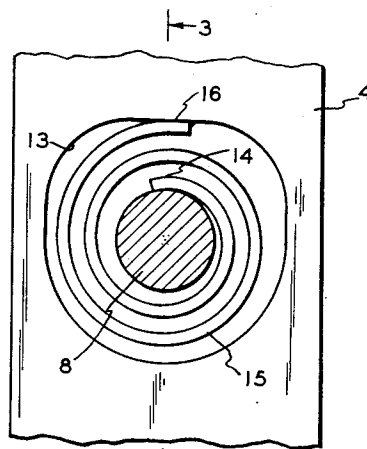


Fig. 2

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RESISTOR STRUCTURE

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6 Claims. (Cl. 201-63)

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This invention relates generally to electrical resistance structures and more specifically to the mounting structure for a plurality of sheet metal resistors secured together in face to face spaced relationship.

The primary object of the invention is to provide a mount for a plurality of spaced resistor grids which is temperature compensating in nature for preventing the warping or deformation of the grids when they become heated.

A more specific object of the invention is to provide a mounting frame for a plurality of resistors secured together in spaced relationship in which resilient temperature compensation elements are utilized to secure the resistors to the mounting frame.

Another object of the invention is to provide a mounting frame for a plurality of resistors secured together in spaced relationship in which a plurality of spring elements are utilized to secure the resistors in the mounting frame, thereby acting as shock absorbing and temperature compensation elements.

A further object of the invention is to provide a mounting frame for a plurality of resistors secured together in spaced relationship by bolts, in which spiral springs are utilized between the securing bolts and the frame to connect the two together while compensating for resistor expansion within the frame under heat and while compensating for vibration shocks.

Another object of the invention is to provide a mounting frame for a bank of resistor elements which are secured together in spaced non-movable relationship in which resilient elements are utilized to connect the frame to the resistor bank for temperature and vibration shock compensation.

A further object of the invention is to provide a mounting frame for a bank of spaced resistors in which resilient elements are utilized to connect the bank of resistors to the frame in such a manner as to allow for a substantial expansion of the resistor bank longitudinally under heat and to restrict any tendency toward lateral displacement of the bank within the frame.

With the foregoing and other objects in view, the invention resides in the following specification and appended claims, certain embodiments and details of construction of which are shown in the accompanying drawings in which:

Figure 1 is a partial end elevational view of a typical resistor bank to which this invention is applied;

Figure 2 is a partially sectioned view taken along the line 2-2 of Fig. 1; and

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Figure 3 is a sectioned view in side elevation taken along the line 3-3 of Fig. 2.

Resistor grids expand and contract in service due to heating, and unless the connection to the mounting frame allows for this expansion, an unnecessary strain is set up in the grids causing warping, breakage, and possible short-circuiting. The prior art has allowed for this expansion by providing elongated holes in the end frame and permitting the grid supporting bolts to move along the elongated holes when the resistor grids were heated. This method of mounting a resistor bank necessitated the use of loose fitting washers or collars over the elongated holes so as not to restrict the movement of the support bolts, and resulted in a resistor bank with loose and rattling end frames. This looseness permitted a general deterioration and breakage of the entire resistor bank and its ceramic insulating tubes and washers under heavy vibrational strains.

The present invention provides a novel and economical means for overcoming the above difficulties encountered in the prior art.

Referring particularly to Figure 1, a plurality of spaced resistor grids 1 are mounted in a carrying frame shown generally at 2. The grids 1 are generally of sheet metal and may be of any desired configuration. The frame 2, which is shown consisting of end members 3 and 4, and a head member 5 secured to the end members 3 and 4 by bolts 6 and 7 respectively, may be of any desired construction, the exact detail of which is not pertinent to the present invention. The grids 1 are secured together in spaced relationship on support bolts 8 and 9. Insulating the grids from the bolts 8 and 9 are ceramic sleeves 10 and 11 respectively. Ceramic washers 12 are provided over sleeves 10 and 11 to space the grids laterally of each other. Connecting leads or washers (not shown) may be provided for connecting the grids together in any desired relationship, such connection not being pertinent to the invention.

Referring to Figures 2 and 3, the bolt 8 is seen to project through hole 13 in end member 4. Welded or otherwise secured to the bolt 8 at point 14 is one end of a helical spring 15. The other end of spring 15 is welded or otherwise secured to the end member 4 at 16. The spring 15 is desirably rather stiff in nature and is made of a highly resilient steel alloy. A similar spring 15 also connects the other end of bolt 8 to the end member 3, although this detail is not shown.

The bolt 9 is shown in Fig. 1 to be tapped at either end to receive threaded end member securing bolts 17. This construction, however, is

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not pertinent to the invention and mounting springs 15 may be provided for bolt 9 in a manner similar to that for bolt 8. When the springs 15 are used at all points of connection between the bolts and the frame members 3 and 4, the transmission of vibrational shocks to grids 1, as applied to the frame 2, is reduced to a minimum.

It is obvious that other spring designs, or rubber, could be substituted for the spring 15 as shown. Rubber, however, is subject to rapid deterioration under high heat conditions. Other spring designs, such as coil springs obviously could be used but are not preferred, as the helical spring lends itself to ready connection and will permit planar movement while resisting trans-planar movement.

The operation of the invention is quite obvious. When electrical currents are applied to the grids 1, they will heat up and expand in accordance with their inherent coefficient of expansion. The springs 15 will allow such expansion by permitting the bolt 8 to move upwardly as viewed in the figures. The springs 15 will, at the same time, resist any tendency of the grids to move transversely of the planes of said springs, thereby maintaining the longitudinal alignment of grids 1. Normally then, under room temperature condition, the bolt 8 will be held by the spring in substantially central position within the holes 13 in end members 3 and 4. When the grids are heated, the bolt 8 will move upwardly out of its central position to compensate for expansion of grids 1, and when the grids are subjected to no electrical currents, and colder than room temperature conditions exist, the bolt 8 will move downwardly from the central position within the holes 13 of the end members 3 and 4, as the grids contract.

Thus it is seen that the invention provides a novel and secure means of connecting a resistor bank to a mounting frame while simultaneously allowing, in said connection, for expansion and contraction of the grids of the resistor bank and for any tendency toward misalignment of the grids of the resistor bank.

What I claim is:

1. An electrical resistance structure comprising a frame with a pair of end members, said end members being bored at one or more points to provide holes therethrough, a pair of resistor grid supporting bolts carried by said frame, at least one of said bolts extending through the holes in the end members of the frame and being of substantially less diameter than the end member hole, and a helical spring connected to each end of the bolt and to the end member in the plane of the end member to permit expansion and contraction of the resistor grid by allowing said supporting bolt to move.

2. An electrical resistance structure comprising a frame with a pair of end members, said end members being bored at one or more points to

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provide holes therethrough, a pair of resistor grid supporting bolts carried by said frame, at least one of said bolts extending through the holes of the end members of the frame and being of substantially less diameter than the end member hole, and resilient means within the holes of the end members and connecting between said end members and said bolt to permit relative movement of the bolt with respect to the frame.

3. An electrical resistance structure comprising a frame with a pair of end members, said end members being bored at one or more points to provide holes therethrough, resistor grid supporting means, and resilient means within the holes of the end members and connecting between said end members and said supporting means to permit relative movement of the bolt with respect to the frame.

4. An electrical resistance structure comprising a frame with a pair of end members, said end members being bored at one or more opposed points to provide holes therethrough, a resistor grid supporting means extending transversely of the end members and through the opposed holes in the end members, and resilient means within the holes of the end members and connecting between said end members and said supporting means to permit the supporting means to move axially of the said end members.

5. An electrical resistance structure comprising a frame with a pair of end members, said end members being bored at two points to provide matching holes therethrough, plural resistor or grid supporting means extending transversely of the end members and through the opposed matching holes in the end members, and resilient means within the holes of the end members and connecting between said end members and said supporting means to permit the supporting means to move axially of the said end members.

6. An electrical resistance structure comprising a frame with a pair of end members, said end members being bored at one or more opposed points to provide holes therethrough, a resistor grid supporting means extending transversely of the end members and through the opposed holes in the end members, and helical spring means within the holes of the end members and connecting between said end members and said supporting means to permit the supporting means to move axially of said end members.

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