

June 29, 1954

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2,682,595

LEAD WIRE PROTECTOR FOR RESISTORS AND THE LIKE

Filed May 16, 1952

Fig. 1.

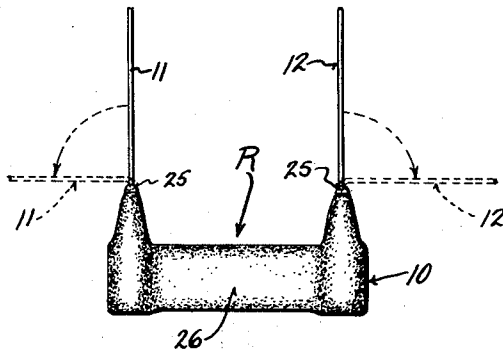


Fig. 2.

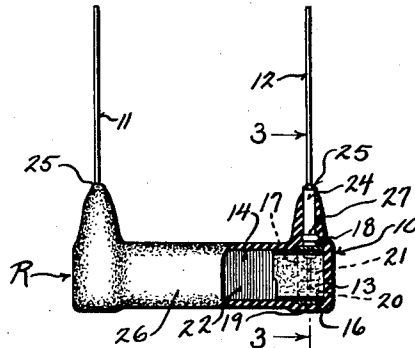


Fig. 3.

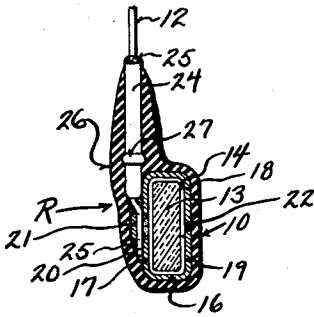


Fig. 4.

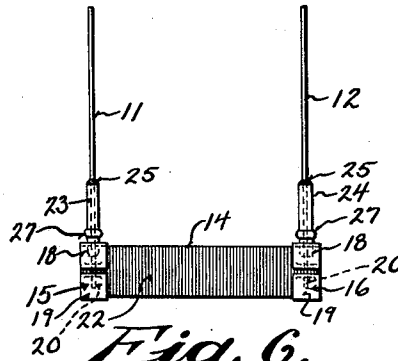


Fig. 5.

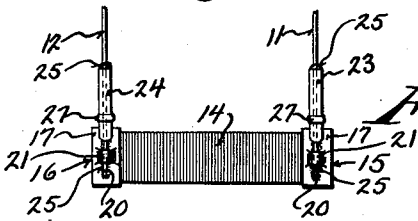


Fig. 7.

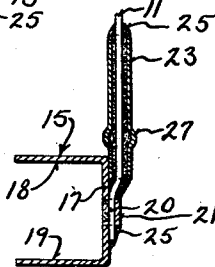
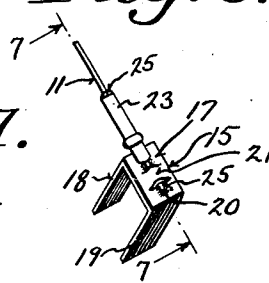
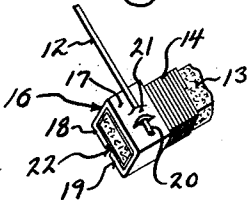


Fig. 8.



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2,682,595

LEAD WIRE PROTECTOR FOR RESISTORS
AND THE LIKE

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Application May 16, 1952, Serial No. 288,227

4 Claims. (Cl. 201—63)

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This invention appertains to electrical resistors and more particularly to a new and novel resistor unit in which the humidity proof coating and lead wires are protected from rupturing or breaking.

Most standard, present day, electrical resistors usually include a core of insulation material such as asbestos over which is tightly wound the resistor wires. The resistor wire is usually of a thin or fine type and the resistance of the resistor is determined by the number of windings, thickness and the particular material of the wire. In order to insert or connect the resistor element to the electrical circuit in which it is desired to be used, flexible relatively thick lead wires are used and these lead wires are in electrical contact with the resistor wire or element usually by being affixed to a metal cap or clip which in turn is tightly fitted or pressed about the respective ends of the resistor wires.

One of the foremost problems in resistor units is due to the effect that moisture and humidity have on the resistance value of the resisting element as under most circumstances it is necessary for the resistor to be able to maintain a steady resistance in a given electrical circuit. In use, the resistor wire becomes highly heated and any moisture which comes in contact with the wire will cause an undesirable variance in the resistance of the resistor with often times damaging results to the whole electrical circuit and apparatus involved. Therefore, it has been the practice in the past to provide some sort of coating over the entire resistor unit in an effort to make the same moisture proof. However, in applying the resistors to the circuit proper the lead wires must be moved or bent and invariably this prolonged movement results in the fracturing or rupturing of the coating and therefore, moisture may penetrate and come in contact with the resistor wire causing the undesired variance in its capacity and short circuiting of the element.

Another danger lies in the fact that the lead wires are usually affixed by soldering, or other means, at one point to the cap or clip and often times the lead wire will break at this point while it is being bent to affix the resistor element to the circuit.

It is therefore, a primary object of my invention to provide an electrical resistor with novel means including protector elements for the lead wires, whereby, the lead wires may be bent in any desired position without the danger of fracturing or breaking either the humidity proof coating or the lead wires per se.

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Another important object of my invention lies in constructing my novel protector elements in the shape of tubes or sleeves which are affixed to a respective end terminal of the resistor element and through which the lead wires extend, thereby, strengthening the lead wires and preventing their movement below the top edge of the tubes.

A further object of my invention is to provide a novel humidity proof coating for the resistor unit which extends from the top edge of the tube or sleeve downwardly and completely over the entire unit.

A still further object of my invention is to provide a sealing means within the protector tubes whereby the interior of the tubes are rendered completely sealed from the effects of outside temperatures and humidity changes.

Still another object of my invention is to provide a resistor unit of a simple, practical and reliable construction that is economical to manufacture, easy to assemble and positive in its operation and which will present a relatively smooth and pleasing appearance without objectionable protuberances.

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

One preferred and practical embodiment of my invention is shown in the accompanying drawings, in which:

Figure 1 is a rear elevational view of my new and novel electrical resistor showing in full and dotted lines, two possible positions of the lead wires;

Figure 2 is a rear elevational view similar to Figure 1 of the drawings but with certain parts being broken away to illustrate further details of construction;

Figure 3 is a transverse sectional view through my resistor unit the section being taken on the line 3—3 of Figure 2 and looking in the direction of the arrows;

Figure 4 is a rear elevational view of my assembled resistor unit before the humidity proof coating has been applied;

Figure 5 is a front elevational view of my assembled resistor unit before the humidity proof coating has been applied;

Figure 6 is a perspective view of one of the end terminal assemblies prior to its being applied about the resistor core and illustrating in

particular a lead wire and my protector tube or sleeve in place;

Figure 7 is a sectional view through the end terminal assembly shown in Figure 6, the section being taken on the line 7-7 of Figure 6 looking in the direction of the arrows and showing how the solder not only aids in holding the protector tube and the lead wire to the end terminal clip, but also how it fills and seals the interior of the tube;

Figure 8 is a fragmentary end view in perspective showing the metal end terminal clip pressed about the resistor wire but before the protector tube element and solder have been applied.

Referring to the drawings in detail wherein similar reference characters designate corresponding parts throughout the several views, the letter "R" generally indicates one type of my improved resistor unit and the same includes broadly the humidity proof resistor body 10 and the outwardly extending lead wires 11 and 12. As illustrated in Figure 1 of the drawings, the lead wires 11 and 12 may be moved and bent to any desired position necessitated in affixing the resistor unit to an electrical circuit (not shown).

The resistor element per se, is of a standard construction having a core 13, of any desired insulated and heat resisting material such as asbestos, about which is tightly wound the resistor wire 14. Conventionally, each end of the wound core 13 is provided with end terminals and while they may be of any type, size or shape, I prefer to use metal clips 15 and 16 respectively. Each end terminal is identically formed from a single length of metal bent in the form of a U and as shown more particularly, in Figures 6 and 7 of the drawings, the end terminal clip 15 includes an intermediate section 17 carrying depending legs 18 and 19.

Secured to the portion 17 of the end clip 15 is the lead wire 11 as shown. The lead wire 11 may be secured in any desired manner such as soldering or as shown, in the preferred form, by slipping the end 20 of the lead wire through the eye 21 which is struck up from the portion 17 of the U-shaped clip and then applying the solder. Each end terminal assembly may be assembled and affixed to the respective end of the wound core 13 by any of a number of methods. One method shown in Figures 6 and 7 of the drawings is to slide my novel protector tube or sleeve 23 over the lead wire and firmly solder the same to the U-shaped clip 15. In so doing I fill the protector tube with solder 25 and the same flows in and around the lead wire and into the space made by the eye 21. Thus, the lead wire 11 is not only firmly soldered to the end clip 15 but is also threaded under the struck up eye 21 and it is to be particularly noted that the solder completely fills the inside of the protector tube or sleeve 23. The reason for this will be more fully indicated as the description proceeds.

The end terminal clip 15 is thus fitted over the respective end of the wound core 13 and the ends of the depending legs 18 and 19 are bent around and firmly pressed into the rear surface 22 of the core 13 as shown more particularly by Figure 4.

It is to be understood that while I have described in particular the construction of end terminal clip 15, that the end terminal clip 16 is identically formed and lead wire 12 is affixed thereto in an identical manner to extend through the protector tube 24.

It is also apparent that I may press the end

clips about the respective ends of the core 13 before I solder the protector tubes in place. This method is illustrated more particularly in Figure 8 of the drawings. The end clip 16 and affixed lead wire 12 are first secured to the respective end of the core 13 after the end terminal assemblies are in place and the protector tube 24 is then affixed in the same manner as above described.

I next apply my humidity proof coating 26. This may be done by dipping the entire unit into the coating proper or building up the coating by spraying or the like on the unit. The coating 26 covers the entire resistor unit and extends upwardly and completely around each of the protective sleeves 23 and 24 terminating just short of the top surfaces thereof. It can thus be seen that any movement of the lead wires 11 or 12 can not be transmitted to the coating 26 to fracture or harm the same in any manner.

While it is not necessary, in the preferred form the solder 25 protrudes above the coating and top surface of the sleeves 23 and 24 shown best in Figure 3 of the drawings, and the same completely surrounds the lead wires. This forms a more complete seal and eliminates some of the strain on the top of the tube or sleeve proper.

While any type of solder may be used, I prefer to use a high temperature solder, preferably one that is solid at 500° F. and liquid at 590° F. This is a sufficiently high temperature to prevent the solder from melting as a result of the heating of the resistor wire 14 when the same is applied to an electrical circuit.

A salient feature of my invention resides in the fact that, not only do the protector tubes or sleeves 23 and 24 prevent the breaking or rupturing of the outer coating 26 due to movement of the lead wires 11 and 12, but the tubes will also aid in absorbing shock and vibrations.

If desired, I also provide each tube 23 and 24 with a circumferential protuberance 27 which serves to further imbed the protector tubes firmly in the coating 26. For example, should for some reason one of the protector tubes work free from its end terminal clip, it would still be firmly held by the protuberance 27 extending into the hard coating and therefore it could not be pulled outwardly from the unit.

My protector tubes could also be applied to electrical fuses of the type having lead wires soldered to end terminal caps or clips but not having a protective coating of any type.

From the foregoing, it is believed that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will, of course, be understood that changes in the form, proportions and minor details of construction may be resorted to without departing from the spirit of the invention or the scope of the appending claims.

I claim:

1. A resistor unit including an insulated core, a resistance element about said core, a pair of end terminals each secured to a respective end of the resistance element, a pair of bendable lead wires each secured to a respective end terminal at its inner end and extending outwardly therefrom, a pair of protector sleeves each secured to a respective end terminal adjacent the point where the lead wire is secured to the end terminal and through which the lead wire extends, said protector sleeves terminating substantially short of the outer ends of said lead wires, and

means for rigidly securing the lead wires to the protector sleeves for the entire length of said sleeve.

2. A resistor unit including an insulated core, a resistance element about said core, a pair of end terminals each secured to a respective end of the resistance element, a pair of bendable lead wires each secured to a respective end terminal at its inner end and extending outwardly therefrom, a pair of protector tubes each secured to a respective end terminal adjacent the point where the lead wire is secured to the end terminal and through which the lead wire extends, said protector tubes outer ends terminating substantially short of the outer ends of said lead wires, the interior of said tubes about said lead wires being completely filled with solder, and a humidity proof coating completely surrounding the resistor unit but terminating just short of the outer ends of the protector tubes, whereby the entire unit is rendered humidity proof and movement of the lead wires will not fracture or rupture the coating.

3. A resistor unit including an insulated core, a resistance element about said core, a pair of end terminals each secured to a respective end of the resistance element, a pair of bendable lead wires each secured to a respective end terminal and extending outwardly therefrom, a pair of protector tubes each being secured to a respective end terminal at a point spaced from and adjacent to the point where a respective lead wire is secured to said end terminal, each of said lead wires extending entirely through a respective protector tube and terminating at a point well beyond the outer end of said tube, the

interior of said tubes about said lead wires being completely filled with solder, and a humidity proof coating completely surrounding the resistor unit but terminating just short of the outer ends of the protector tubes, whereby the entire unit is rendered humidity proof and movement of the lead wires will not fracture or rupture the coating.

4. The combination of a resistor unit of the type having an insulated core, a resistance element, a pair of end terminal clips pressed around said resistance element and core adjacent each end thereof, a pair of bendable lead wires secured to a respective end terminal clip and extending outwardly therefrom and a protective coating over the entire unit, of a pair of protector tubes each rigidly secured to a respective end terminal clip and extending outwardly with the respective lead wire but terminating substantially short of the outer end thereof, a protective coating covering a portion of each protector tube, and means including high temperature solder completely filling the inside of the tubes for sealing the unit against the effects of moisture and humidity.

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