March 24, 1959 G. J. MUCHER 2,879,364

FUSE-RESISTOR

Filed Nov. 29, 1954

Fig. 1

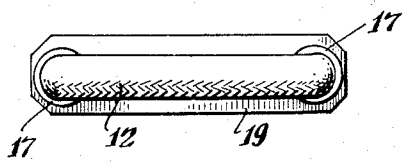


Fig. 2

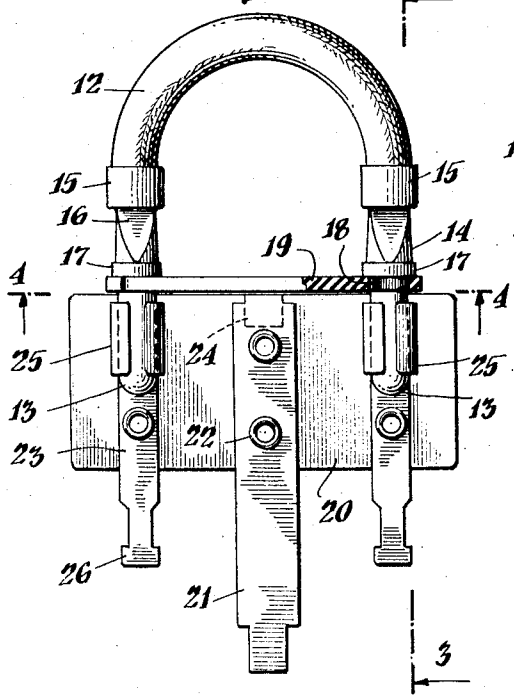


Fig. 3

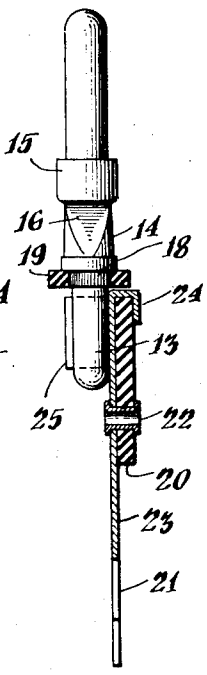


Fig. 4

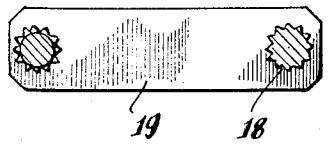
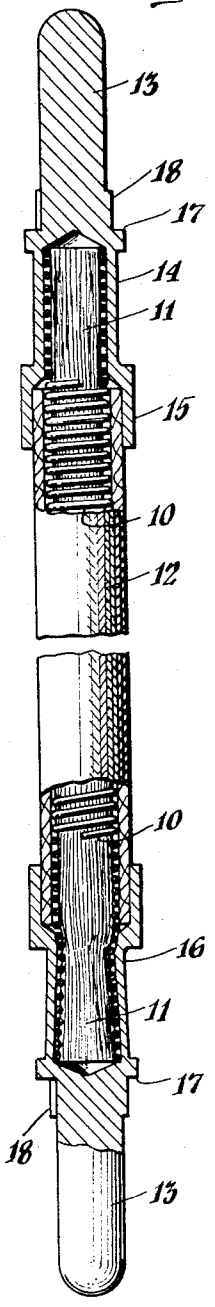


Fig. 5



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United States Patent Office 2,879,364
Patented Mar. 24, 1959

2,879,364

FUSE-RESISTOR

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Application November 29, 1954, Serial No. 471,634

1 Claim. (Cl. 201—67)

This invention relates to a structurally and functionally improved assembly of an electrical resistor which will also act as a fuse-element.

It is an object of the invention to furnish a resistor which may be used in numerous different associations and is of practical utility when included in electrical circuits such as are embraced in radio receivers, television sets, electrical phonographs, etc. According to the present teachings this resistor will also have the function of a fuse-unit which will become operative to interrupt the circuit upon certain conditions of load being exceeded and thereby protect the components of the apparatus within which it is included. Moreover, the present resistor may, without the aid of tools, be included in a desired circuit or removed therefrom with facility.

An additional object is that of furnishing an assembly which may readily be grasped and manipulated by an operator and in which the electrical values embraced in the resistor will be apparent to the user without difficulty.

An additional object is that of providing a resistor and socket assembly which will include relatively few and rugged parts capable of ready manufacture by automatic machinery and which parts will function over long periods of time under proper operating conditions and with freedom from all difficulties.

With these and other objects in mind reference is had to the attached sheet of drawings illustrating one practical embodiment of the invention and in which:

Fig. 1 is a plan view of the resistor;

Fig. 2 is a side elevation of the same in association with a socket and with certain parts broken away to disclose underlying construction;

Fig. 3 is a sectional side view taken along the line 3—3 and in the direction of the arrows as indicated in Fig. 2;

Fig. 4 is a sectional bottom plan view taken along the line 4—4 in the direction of the arrows as also indicated in Fig. 2 and

Fig. 5 is a fragmentary view of the resistor element prior to its assembly with a mounting plate and certain of the parts are broken away to disclose underlying construction; also parts being shown in section.

Referring primarily to Fig. 5, there has been shown a resistor-unit which includes the usual convolutions of wire **10** providing the resistance proper. These wires are wound around a core **11** and are preferably enclosed within a sheath or tube **12**. Both the latter and core **11** are flexible. They are preferably formed of glass fiber although other materials may be employed. As shown especially in this view, the sheath or tube **12** in a completed assembly terminates short of the ends of core **11** upon the outer face of which there are exposed the wire convolutions of the resistor.

Heat dissipating terminals are applied to the end of this assembly and include outer portions **13** which may be solid. Tubular parts **14** are provided adjacent parts

13 and an enlarged tubular part **15** may be furnished to the rear of part **14**. The bore of the portion **14** has a diameter adequate to permit of the outer end of core **11** together with the wire convolutions **10** carried thereby to enter it. The bore of portion **15** has a diameter such that not alone may these parts be received into it, but also the sheath or tube **12** may be accommodated therein. Therefore, the edge zone of this tube is adequately housed and prevented from "mushrooming." Portion **14** is constricted. Therefore, a firm electrical contact will be established between the terminal and the convolutions of the wire **10**.

Of course, instead of constricting the bore portions of the sheath in a substantially uniform manner and throughout their entire length, only constriction through a single zone may be resorted to. The former condition is illustrated in the upper part of Figure 5. The latter condition is shown in the lower portion of that figure. With particular reference to the latter, attention is invited to the zone indicated by the numeral **16**. It will be seen that a forcible constrictive action has been resorted to in that zone which may be generally defined as the point at which sheath portions **14** and **15** meet. It is obvious that this procedure will result in the necessary confining action on the end area of tube or sleeve **12** in addition to providing firm electrical contact between the terminal and the exposed convolutions of the wire **10**. Therefore, the parts will not be accidentally separated and, in effect, the end of the resistor will "key" into the bore of the inner sheath portion.

The terminal portions **13** are in accordance with the present teachings defined at their inner ends by stop shoulders **17**. Outwardly of these shoulders knurling may be resorted to as at **18**. A mounting plate **19** of suitable insulating material has its opposite end zones formed with openings. These openings have a diameter such that the terminal portions, at points short of the shoulder **17**, may properly pass therethrough. However, the knurled, ribbed or otherwise formed zones **18**, when forced into these openings, will frictionally engage the edges of the latter. That engagement will be sufficiently intimate that a subsequent accidental withdrawal of the terminals through these openings will be precluded. So positioned the resistor will extend as especially shown in Figs. 2 and 3 in the form of a semi-circle with the end contacts **13** or terminals projecting beyond the face of plate **19**. That plate may carry suitable indicia such that the electrical value of the resistor may be displayed thereon. The plate being in effect rigid, it is obvious that a manipulating part is provided which may readily be grasped by the operator for the purpose of shifting the resistor.

A socket suitable for the reception of the terminals or end portions of the resistor is furnished by, for example, employing an insulating strip **20**, from which a mounting tab **21** may project; the latter being secured thereto by, for example, rivets **22**. Strips **23** of metal may be similarly secured to plate **20** and have their upper end stabilized by extending around the upper edges of the plate or strip **20** as at **24**. In line with these extended portions the plate is preferably formed with notches. The upper ends of strips **23** include wing portions **25** which are bent towards each other to define sockets. The metal of these strips may embody a certain amount of resiliency. Therefore, if these wing portions are initially disposed to define a bore of slightly lesser diameter than end portions **13**, it is apparent that as the latter are projected into the sockets firm electrical contact will be established. The lower ends of strips **23** are conveniently formed to provide terminal portions **26**. To these the leads, forming parts of the circuit within which the resistor is to be included, are attached.

In use, it will be appreciated that the mounting member **20** is suitably supported within a chassis embracing the required circuit. This mounting may be established as by strip **21**. As afore brought out, the outer ends of strips **23** are connected to circuit-leads. The resistor will, of course, be supplied as a complete unit of which plate **19** forms a permanent part. The operator, after ascertaining that the resistor is of proper value, and by simply grasping that plate, will be able to project the terminal portions **13** one into each of the sockets furnished by strips **23** or their functional equivalents. With such manipulation the knurled portions of the terminals **13** will continue to assure the proper retention and spacing of the resistor ends. No soldering of the resistor ends to the leads included in a circuit will be necessary.

Assuming that the resistor is of a 7.5 ohm type it will normally carry a current of 1 ampere. It will withstand surge currents of 1.75 amperes. It will fuse at 2.3 amperes in an interval of time sufficiently short that the components of the circuit will be protected against damage. This fusing will occur at a point intermediate the terminal assemblies. As will be appreciated, the latter being formed of metal and involving substantial mass, the end zones of the resistor assembly will embody relatively high heat-dissipating characteristics. This, however, will not be true of the central portion of the same. It therefore follows that fusing will normally occur in that portion with the wire **10** and sheath **12** fusing substantially simultaneously, thus providing an outward sign of fusion of the plug-in fuse type resistor.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. It is obvious that numerous changes in construction and rearrangement of the parts may be resorted to without departing from the spirit of the invention as defined by the claim.

What is claimed is:

An electrical plug-in fuse and socket combination comprising a resistor having a flexible incombustible low-heat-dissipating cylindrical central core formed of fiber glass, an electrically conducting wire wound about said core having a resistance of predetermined value, a sheath

formed of glass fibers enclosing said core and said wire, the glass fiber of said core and said sheath being fusible by action of heat dissipated from said wire through conduction of electricity therethrough but being incombustible after fusing by said heat, said fiber glass sheath terminating short of the ends of said core thereof whereby the ends of said wire wound about said core project beyond said sheath, a pair of heat-dissipating rigid metal tubular terminals connected to the ends of the wire at opposite ends of said core, a rigid plate of dielectric and heat-insulating material formed with engaging openings adjacent its ends into which said tubular terminals are mounted, shoulders at each of said terminals to abut said plate, the inserted portions on each of said terminals adjacent said shoulders frictionally engaging the inner surface of said openings to thereby secure said terminals against accidental withdrawal from said plate, a socket unit including an insulating strip below said mounting plate provided with high-heat-dissipating metal sockets which are in fixed spaced apart relationship to enclose said tubular terminals, said core, wire and sheath being bent in substantially U form with the terminal ends thereof extending into said plate and sockets with said plate lying transversely across the axis of each of said terminals, the body of the resistor projecting beyond said plate to be readily noticeable, the heat dissipation at the socket portions immediately adjacent the high-heat-dissipating metal sockets and tubular terminals being greater than in the body of the U of the resistor whereby the lower dissipation of heat in said body causes simultaneous fusion of said sheath and said wire which is readily visible.

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