July 17, 1928. 1,677,240

F. S. KOCHENDORFER ET AL

RESISTANCE UNIT

Filed Dec. 27. 1922

Fig. 1.

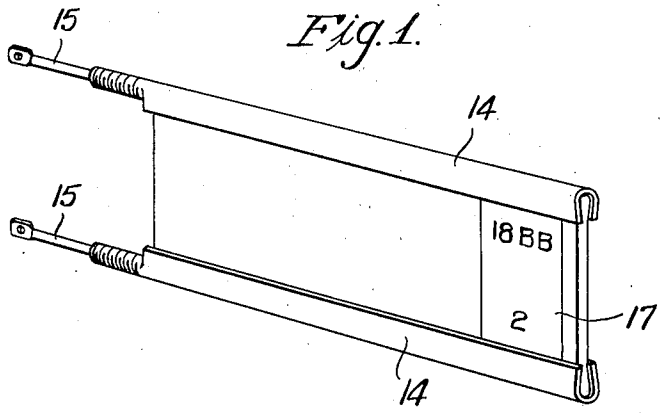


Fig. 2.

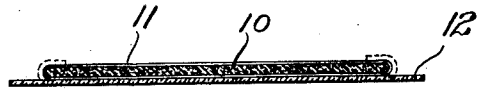


Fig. 3.

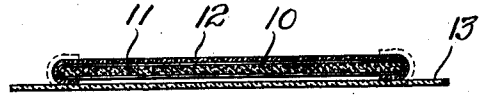


Fig. 4.

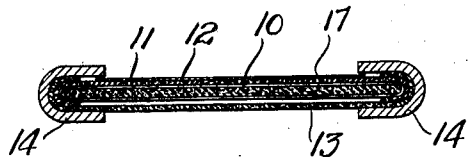
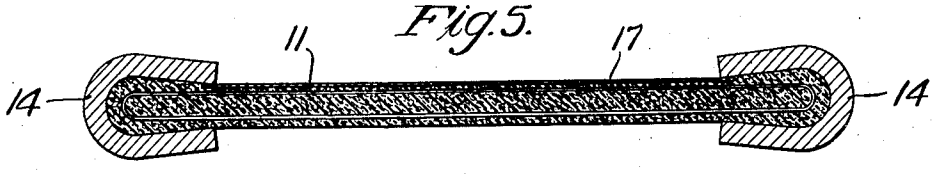


Fig. 5.



Inventors.
Frederic S. Kochendorfer
Terence A. Gill
by H. A. Pattison
Atty.

Patented July 17, 1928. 1,677,240

UNITED STATES PATENT OFFICE.

FREDERIC SHIELDS KOCHENDORFER, OF RIVER FOREST, ILLINOIS, AND TERENCE ALISTER GILL, OF SHAWINIGAN FALLS, QUEBEC, CANADA, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

RESISTANCE UNIT.

Application filed December 27, 1922. Serial No. 609,219.

This invention relates to an improved resistance unit and method of making the same.

More particularly the invention relates to improvements in the construction and manufacture of resistance units of the type comprising a plate like body portion supporting the resistance member and its insulating elements and metal binding strips attached thereto which carry terminals for the coil and serve as means for supporting the unit. Resistance units of this type are especially adapted for use in telephone circuits, and particularly designed for support on telephone switchboards, where they function in the circuits thereof.

A primary object of the invention is to produce a resistance unit of this type which is efficient, durable, and which may be manufactured at considerably lower cost than formerly.

Heretofore resistance units of this type have been produced by winding a resistance wire around a plate-like core made of mica, and by enclosing the coil thus produced between mica sheets, said elements being held together by means of metal strips which were attached by riveting. On account of the brittleness of the mica, this riveting operation frequently damaged the unit, causing open windings resulting in a large number of defective coils. Where units were made by this method it was the practice to provide means for identifying the various types, sizes and capacities of units by stamping the code number into the mica sheets enclosing the coil, and this operation frequently resulted in the mica being damaged to such an extent that its insulating properties were materially reduced.

In accordance with the present invention, the core and insulating elements for the resistance coil are made of partially cured phenolized fiber, preferably asbestos, to which metallic binding strips carrying terminal posts are applied. The assembled unit is then subjected to heat and pressure which serve both to completely cure the phenolized fiber and mold the core and insulating elements into a homogeneous structure. Where the unit is to be identified, a gummed label bearing the desired information as to type, size, or capacity, etc., is stuck to the upper surface of one of the insulating elements preparatory to the final curing operation, and when the unit is subjected to heat and pressure the label will be pressed into the adjacent surface of the insulating element.

The accompanying drawings illustrate one embodiment of the invention and illustrate diagrammatically a method of making the same, and in which:

Fig. 1 is perspective view of a resistance element made in accordance with the invention;

Fig. 2 is a cross sectional view of the same during an early stage of its manufacture:

Fig. 3 is a cross sectional view of the same at a later stage of manufacture;

Fig. 4 is a cross sectional view of the same previous to the final operation; and

Fig. 5 is an enlarged cross sectional view of the completed unit.

The construction of the resistance unit will be clearly understood by a description of the method of its manufacture.

A resistance wire is wound around a core 10, preferably made of partially cured phenolized asbestos, to form a coil 11. A sheet 12 of the same material as the core 10, but wider than the core and of less thickness, is first suitably heated to soften it, as by drawing the same across a heated plate, and is then applied against one of the faces of the coil 11 with its edges bent over the sides of the same, as is shown in Fig. 2. Another sheet 13 of the same material as the first sheet but slightly wider, is then similarly softened and applied to the opposite face of the coil 11 with its edges overlapping the edges of the sheet previously applied, as shown in Fig. 3.

The overlapping portions of the sheets 12 and 13 form a beading at each side of the core and on these beadings U-shaped metal strips 14 are slipped. The assembled unit is then placed in a suitable mold and heat and pressure applied to completely cure the phenolized material constituting the core and covering sheets molding them into a homogeneous structure and press the edges thereof into the metal strips 14, these strips being bent inwardly at the same time to clamp them to the beading, as is shown in Figs. 1 and 5. The strips 14 provide a pro-

tection for the edge of the molded unit and carry terminal posts 15.

Where the unit is to be identified, a label 17 is stuck to one of the covering sheets, as shown in Fig. 4. When the assembled unit is subjected to heat and pressure, the label is pressed into the adjacent covering sheet and is thereby firmly attached thereto. A suitable adhesive is used to hold the label in place prior to the molding operation, and this material also prevents the phenol from soaking through the label during the molding and final curing operation.

The strips 14, in adidtion to carrying the terminals for the coil, also provide a means for attaching the unit to the back of a telephone switchboard, for which purpose the unit is particularly designed, where it functions in the circuits thereof.

Although asbestos impregnated with a phenolic condensation product is preferably used as the material for the core and covering sheets, since the asbestos gives the unit sufficient body and strength and is incombustible and the phenolic condensation product has a sufficiently high melting point to resist heat in service and at the same time may be cured sufficiently rapidly to make manufacture commercial, it is to be understood that other suitable fibrous materials may be employed impregnated with suitable insulating materials such as varnish, shellac, natural or artificial resins, etc., without departing from the spirit and scope of the present invention.

A resistance unit having the construction above described has the further advantage that upon subjection to excessive current it functions as a fuse to interrupt the circuit through the resistance coil. When the resistance coil is subjected to excessive current, it becomes heated to a temperature sufficient to cause the resin to begin to carbonize, which throws off a gas, and since this gas is confined between the core and adjacent cover, it causes the latter to expand and break the resistance wires which are embedded in the cover. The fact that upon being subjected to excess current, the unit is deformed, permits its ready detection among a bank of good units, whereby its replacement is facilitated.

What is claimed is:

1. A resistance unit comprising a core and a resistance coil wound thereon, and a covering for the coil comprising two sheets applied one against each face of said coil, said core and sheets being formed of fibrous material impregnated with an insulating resin.

2. A resistance unit comprising a core and a resistance coil wound thereon, and a covering for the coil comprising two sheets applied one against each face of said coil and having their edges bent over and overlapping the sides thereof, said core and sheets being formed of fiber impregnated with an insulating resin.

3. A resistance unit comprising a core and a resistance coil wound thereon, and a covering for the coil comprising two sheets applied one against each face of said coil and having their edges bent over and overlapping the sides thereof and overlapping each other, said core and sheets being formed of fibrous material impregnated with an insulating resin.

4. A resistance unit comprising a core, a resistance coil wound thereon, a covering for the coil, said core and covering being formed of fibrous material impregnated with an insulating resin and constituting a homogeneous structure, metallic members binding opposite edges of said structure, and a terminal post carried by each of said metallic members.

5. A resistance unit comprising a core, a resistance coil wound thereon, a covering for the coil, said core and covering being formed of fibrous material impregnated with an insulating resin and constituting a homogeneous structure, metallic members binding opposite edges of said structure and affording a support for the unit, and a terminal carried by each of said members.

6. A resistance unit comprising a core, a resistance coil wound thereon, a covering for the coil, said core and covering being formed of fibrous material impregnated with an insulating resin and constituting a homogeneous structure, U-shaped metallic members binding opposite edges of said structure and affording a support for the unit, and a terminal carried by each of said U-shaped members.

7. A resistance unit comprising an insulating core, a resistance coil wound thereon, an outer covering therefor comprising two insulating sheets applied one against each side of the coil and having their edges bent over and overlapping the sides thereof to form a beaded portion at each side of the core, a metallic member inserted on each beaded portion, and a terminal post carried by each of said metallic members.

8. A resistance unit comprising a core, a resistance coil wound thereon, an outer covering therefor comprising two sheets applied one against each side of the coil and having their edges bent over and overlapping the sides thereof to form a beaded portion at each side of the core, said core and sheets being formed of fibrous material impregnated with an insulating resin, and a metallic member attached to each of said beaded portions.

9. A resistance unit comprising a resistance coil and a covering therefor made of fibrous material impregnated with an insulating resin, and an identifying label

applied to said covering and secured thereto by the resin therein.

10. A resistance unit comprising a resistance coil and a covering therefor made of fibrous material impregnated with an insulating resin partially cured, and an identifying label attached to said covering by an adhesive material.

11. A method of producing a resistance unit, which consists in assembling a resistance element and suitable insulating elements formed of partially cured fibrous material impregnated with an insulating resin, and then subjecting the assembled unit to the action of heat and pressure for completing the curing of said insulating elements.

12. A method of producing a resistance unit, which consists in assembling a resistance element and suitable insulating elements formed of partially cured fibrous material impregnated with an insulating resin, and then subjecting the assembled unit to the action of heat and pressure to completely cure the insulating elements and mold the elements and unit into a homogeneous structure.

13. The method of producing a resistance unit, which consists in first winding a resistance wire around an insulating core, then applying a covering against one of the faces of the coil thus formed, said covering being made of previously heated material in sheet form impregnated with an insulating resin, then bending the edges of said covering over and against the sides of said coil overlapping part of the opposite face, then applying a second similar previously heated covering in sheet form against the other face of the coil, then bending the edges of the same over and against the sides overlapping part of the surface of the first covering, and then subjecting the unit to heat pressure to mold the coverings and core into a homogeneous structure.

14. The method of producing a resistance unit, which consists in first winding a resistance wire around a core formed of material impregnated with a resin having a phenol base and partially cured, then applying a covering against one of the faces of the coil thus formed, said covering being made of previously heated material of the same kind as the core and partially cured, then bending the edges of said covering over and against the sides of said coil overlapping part of the opposite face, then applying a second similar previously heated covering against the other face of the coil, then bending the edges of the same over and against the sides thereof overlapping part of the surface of the first covering, then placing the assembled unit in a mold and subjecting the same to heat and pressure to completely cure the phenol material and mold the core and covering into a homogeneous structure.

15. A resistance unit comprising a core, a resistance coil wound thereon, and a covering for the coil, said core and covering constituting a homogeneous structure of insulating resinous material.

16. A resistance unit comprising a core, a resistance coil wound thereon, a covering for the coil, said core and covering constituting a homogeneous structure of insulating material having opposite edges, metallic members binding opposite edges of said structure and affording a support for the unit, and a terminal carried by each of said members.

17. A method of producing a resistance unit, which consists in applying a resistance wire to a core formed of insulating material, covering the coil with insulating material, and then molding the assembled unit into a homogeneous structure.

18. A method of producing a resistance unit, which consists in applying a resistance wire to a core formed of insulating material, covering the coil with insulating material, and then subjecting the assembled unit to the action of heat and pressure to mold the core and covering into a homogeneous structure.

In witness whereof, we have hereunto subscribed our names, this 9th and 13th days of December, A. D. 1922.

FREDERIC SHIELDS KOCHENDORFER.
TERENCE ALISTER GILL.