United States Patent

[11] 3,581,266

[72] Inventor **Lionel E. Weyenberg**
N34 W23575 Capitol Drive Parkway,
Pewaukee, Wis. 53072

[21] Appl. No. **787,806**
[22] Filed **Dec. 30, 1968**
[45] Patented **May 25, 1971**

[54] **HOUSED RESISTOR**
5 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **338/253,** 174/52, 264/272, 338/243, 338/270, 338/315
[51] **Int. Cl.** **H01c 1/02**
[50] **Field of Search** 338/226, 243, 252, 253, 256, 257, 267, 268, 269, 270, 275; 264/272; 174/52.6

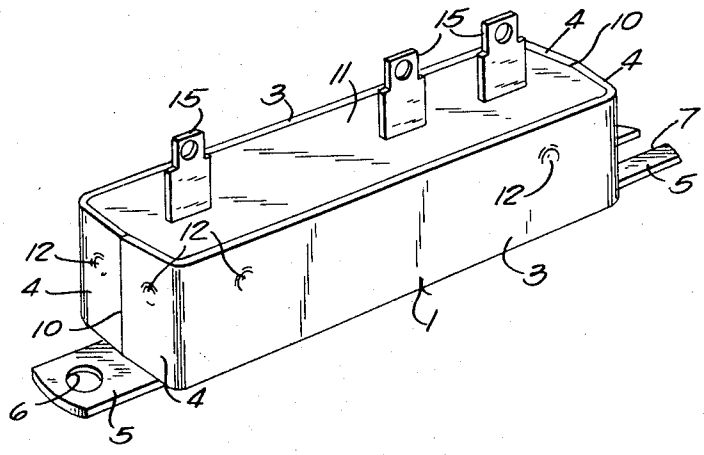
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Primary Examiner—E. A. Goldberg
Attorney—Andrus, Sceales, Starke and Sawall

ABSTRACT: A potted resistor including an outer metal casing, and a resistance element is embedded within an insulating material contained within the casing. Terminal strips are connected to the resistance element and project outwardly of the insulating material in position to be connected to electrical leads.



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SHEET 1 OF 2

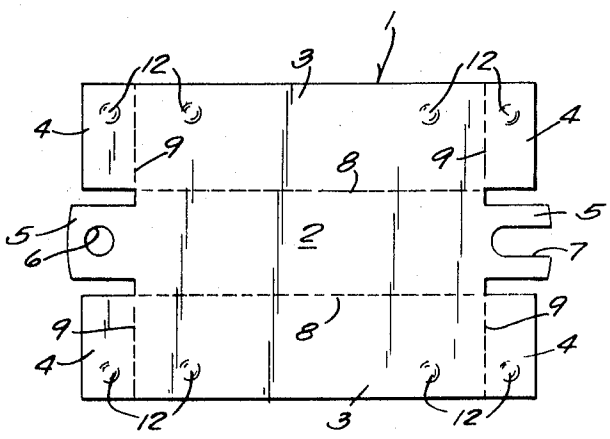


Fig. 1

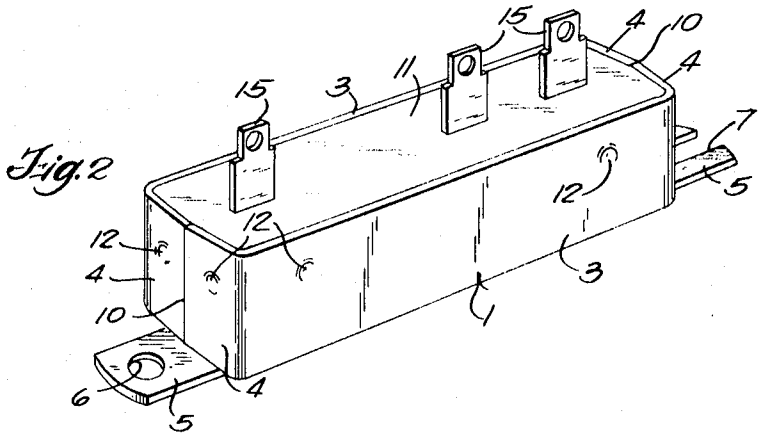


Fig. 2

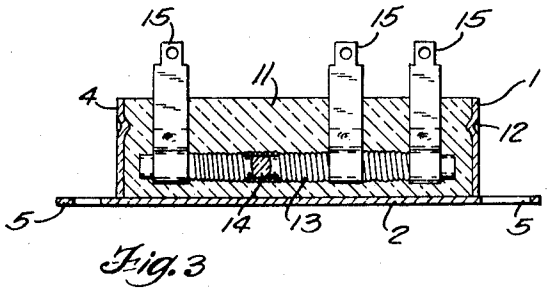


Fig. 3

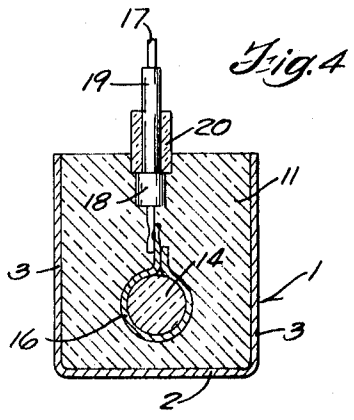
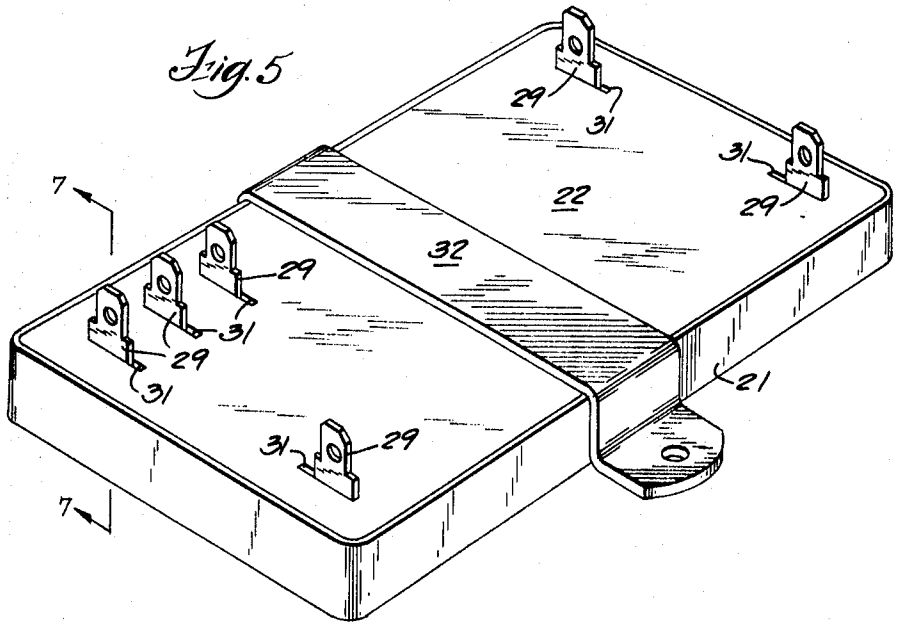


Fig. 4

Inventor
Lionel E. Weyenberg
By
Andrus, Sceales, Starke & Sawall
Attorneys

Fig. 5



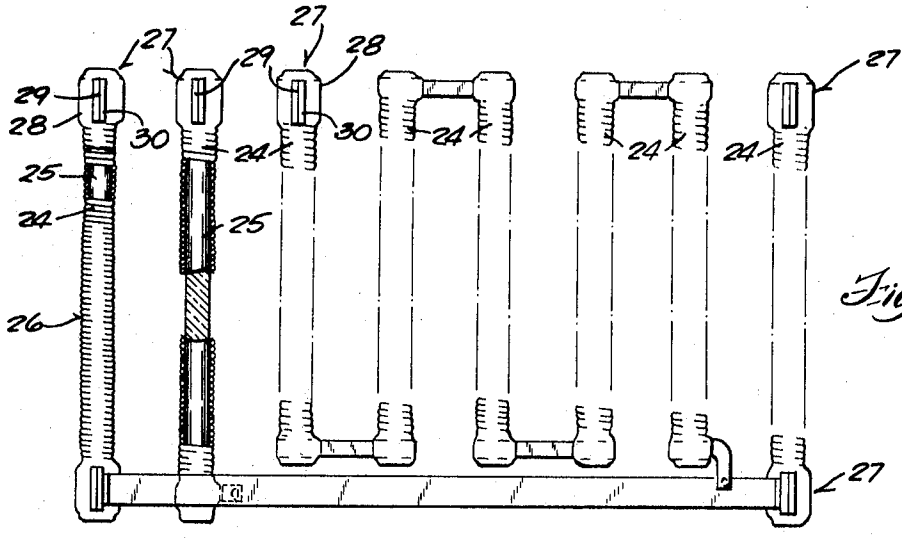


Fig. 6

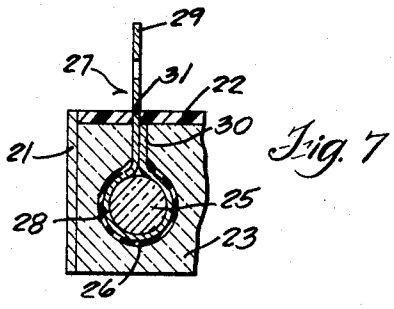


Fig. 7

Inventor
Lionel E. Weyenberg
By
Andrus, Sceales, Starke & Sawall
Attorneys

HOUSED RESISTOR

The invention relates to an electrical resistor and more particularly to a resistor which is potted or embedded within an insulating material.

Electrical resistors are frequently fabricated in a manner in which the resistance element is embedded within a molded jacket of insulating material, and terminal strips are connected to the resistance element and project outwardly of the jacket in a position where they can be connected to electrical leads. Potted resistors of this type are virtually unbreakable and as the resistance element is sealed within the insulating jacket the resistor has particular application for use in conditions of moisture or water exposure.

The present invention is directed to an improved potted type of resistor. In accordance with the invention the resistor includes an open top metal casing which is formed from a single blank and includes a bottom wall, sidewalls and end walls as well as mounting tabs. A resistance element, such as a helically wound resistance wire, is located within the casing and embedded within an insulating material. Terminal strips are connected to the resistance wire and project outwardly of the insulating material in position to be connected to electrical leads.

Due to the fact that the resistance element is embedded within the ceramic material the resistor is durable and virtually unbreakable. Moreover, the resistance element is sealed within the insulating jacket so that the resistor can be exposed to moisture conditions in service.

The metal casing is a one-piece member which simplifies the construction and eliminates welding in fabrication. Moreover, the metal casing serves as a heat sink which aids in dissipating heat to the atmosphere and, in addition, the base **2** and tabs **5** aid in transferring heat to the supporting surface or panel, thereby enabling the resistor to carry greater wattage for a given size.

In a second form of the invention, the resistor includes a metal frame having an open top and bottom, and an insulating panel encloses the open top of the frame. A resistance element is embedded within insulating material contained within the frame and terminal strips project through slots in the insulating panel in position to be attached to electrical leads.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

FIG. **1** is a plan view of a metal blank employed to fabricate the metal casing of the resistor;

FIG. **2** is a perspective view of the resistor;

FIG. **3** is a longitudinal section of the resistor with parts broken away in section;

FIG. **4** is a transverse section of a modified form of the resistor;

FIG. **5** is a perspective view of a second modified form of the invention;

FIG. **6** is a plan view with parts broken away in section showing the resistance element of the resistor of FIG. **5**; and

FIG. **7** is a fragmentary section showing the terminal strip projecting through the slotted panel of the resistor of FIG. **5**.

FIG. **2** illustrates a potted type of electrical resistor including a metal casing **1** which comprises a bottom wall **2**, a pair of sidewalls **3** and end walls **4**. Mounting brackets **5** project outwardly from the ends of the bottom wall and one of the mounting brackets is provided with a hole **6**, while the other mounting bracket is provided with a slot **7** for connection to a suitable supporting surface.

The metal casing **1** is a one-piece member formed from a flat metal blank. The blank is stamped or cut with the configuration shown in FIG. **1** and the blank is then bent along the lines **8** to form the sidewalls, and similarly is bent along the lines **9** to provide the end walls. The end walls **4**, as shown in FIG. **2**, are in abutting relation and are not connected together along the joint **10**. With this construction, the metal casing **1** is readily fabricated from a single blank without the necessity of welding and without the use of auxiliary fasteners or connectors.

An electrically insulating material **11** is disposed within the interior of the casing **1** and may be formed of any conventional ceramic or refractory material capable of withstanding the temperatures involved. To prevent the removal of the insulating material **11** from the metal casing **1**, the casing is provided with a series of inwardly extending dimples **12**.

Embedded within the insulating material is a resistance element which comprises a resistance wire **13** which is helically wound about an insulating core **14**. A series of terminal strips **15** encircle the core **14** and are welded to the wire **13**. As shown in FIG. **3**, the ends of the terminal strips project outwardly of the insulating material **11** in position to be attached to suitable electrical leads.

As the resistance wire **13** is completely embedded within the insulating material the resistor is durable and virtually unbreakable. Moreover, the insulating material serves to seal the resistance wire so that the resistor can be exposed in service to moisture conditions without affecting the performance of the resistor.

The metal casing **1** is formed from a single blank of material and not only provides the walls, but also incorporates the mounting brackets. This construction greatly simplifies the fabrication of the resistor for welding of the casing is eliminated and no auxiliary fasteners or connectors are required. The metal casing **1** also functions as a heat sink which acts to dissipate heat from the resistor and thereby permits greater wattage to be carried for a given size resistor.

FIG. **4** illustrates a modified form of the invention employing a different type of terminal connection. In this embodiment a strip **16** encircles the insulating core **14** and a wire **17** is welded to the strip **16**. A weld tab **18** is provided on the wire and the wire is encased within an insulating coating **19** and an insulating sleeve **20**. The metal casing utilized in the embodiment of FIG. **4** is identical to that shown with respect to FIGS. **1—3**.

FIGS. **5—7** illustrate a second modified form of the invention which includes a generally rectangular frame **21** having open top and bottom. An insulating panel or board **22** encloses the open top of the frame and an insulating material **23** similar to material **11** is cast within the frame. Embedded within the insulating material **23** is a resistance element composed of a series of interconnected resistance wires **24** which are wound on insulating cores **25**. A ceramic coating **26** can be applied to the wires **24** prior to embedding the resistance element in the insulating material **23**, is desired. While FIG. **6** shows six resistant wires **24** it is contemplated that one or more wires can be employed and they can be connected together in any desired arrangement.

Terminal strips **27** are connected to the wires **24** at any desired location, and as shown in FIG. **7**, the terminal strip comprises a generally circular body portion **28** which encircles the insulating core **25** and a pair of ends **29** and **30** extend outwardly from the body portion of the terminal strips.

One of the ends **29** extends through a slot **31** formed in the panel **22**, while the second end **30** bears against the under surface of the panel **22**. The engagement of the end **30** with the panel **22** serves to space the resistance element from the panel during the molding operation so that the insulating material **23** will flow around and completely embed the resistance element.

A suitable mounting bracket **32** can be connected to the metal frame **21**.

In fabricating the resistor of FIGS. **5—7**, the panel **22** is initially inserted within the frame **21**, and the resistance element is then positioned within the frame with the ends **29** of the terminal strips **27** being inserted through the slots **31** in the panel until the ends **30** bear against the panel to space the resistance element above the panel. The insulating material **23** is then cast into the open upper end of the frame, completely filling the frame and embedding the resistance wires **24**.

The resistor of the invention is a durable unit having improved economy in manufacture. The metal casing provides a heat sink which aids in dissipating heat from the resistor so that the resistor is capable of carrying greater wattages for a given size than a conventional potted resistor.

I claim:

1. An electrical resistor, comprising an open-top metal casing including a bottom wall a pair of sidewalls and a pair of end walls, said end walls and sidewalls being connected integrally to the bottom wall and each end wall including a pair of end sections, one side edge of each end section being integrally connected to the corresponding sidewall and the other side edge of each end section disposed in abutting relation with a side edge of the adjacent end section to provide an unconnected joint between said end sections at each end of the resistor, a mounting tab integrally connected to each end of the bottom wall and extending outwardly therefrom beneath said end walls, an insulating material disposed within the casing, and substantially filling the casing, a resistance element

embedded within the insulating material, terminal means connected to the resistance element and projecting outwardly of said insulating material in a position to be attached to electrical leads, and means projecting inwardly of the casing and engaged with the insulating material to prevent free removal of said insulating material from the casing.

2. The resistor of claim 1, wherein said terminal means comprises a generally flat metal strip.

3. The resistor of claim 1, wherein said terminal means comprises a wire, and an insulating sleeve surrounding said wire.

4. The resistor of claim 1, wherein said resistance element comprises an insulating core and a generally helically wound resistance wire disposed on said core.

5. The resistor of claim 1, and including an electrically insulating sleeve disposed around said terminal means and extending from beneath the upper surface of the insulating material to a substantial distance above said upper surface.