Aug. 22, 1967 V. V. HUKEE 3,337,832

RESISTOR

Filed Jan. 26, 1965

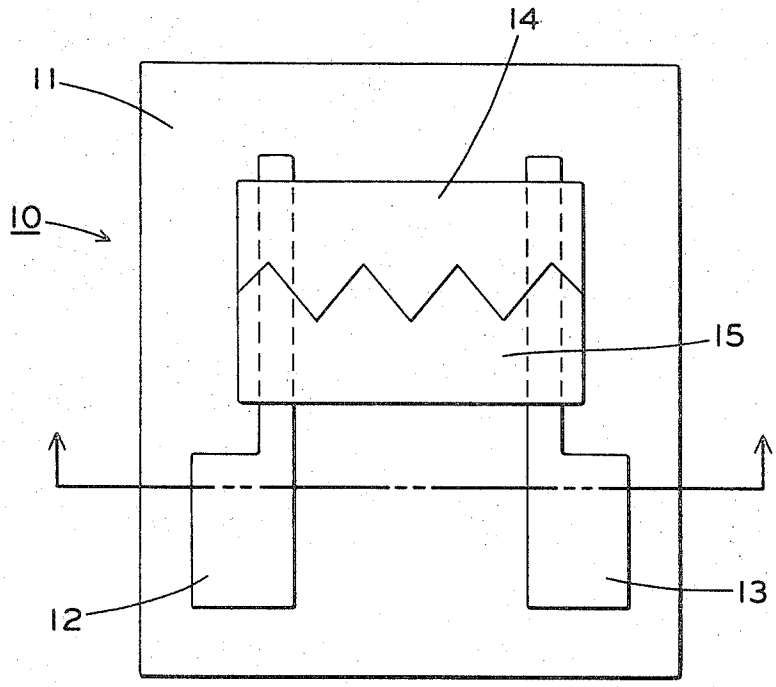

FIG. 1

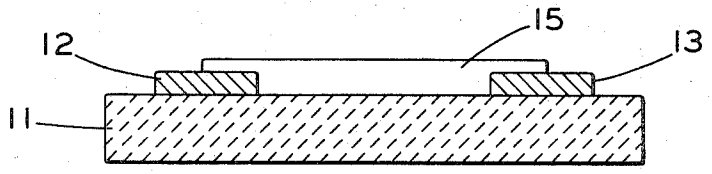

FIG. 2

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RESISTOR

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ABSTRACT OF THE DISCLOSURE

A resistor comprising an insulating support having a pair of support terminals carried thereby. A low resistance film is coplanar with a high resistance film deposited on said support. Said films extended between and in contact with said terminals in a parallel arrangement. Adjoining boundaries of said films are in electrical connection along the full length thereof.

The present invention is concerned with a resistor accurately adjustable over a wide range of resistance values.

The art has long needed an inexpensive resistor which can be adjusted by trimming to a resistance value anywhere within a range of values extending up to many times the initial resistance. Presently available resistors are commonly capable of adjustment to about two times their initial value.

An object of the present invention is to provide a resistor which can be adjusted by trimming to a resistance value anywhere within a wide range of values.

Other objects and advantages of the present invention will be made obvious to those skilled in the art by the following description when considered in relation to the accompanying drawing of which:

FIGURE 1 is a plan view of the resistor of the present invention.

FIGURE 2 is a side view in section of the resistor of FIGURE 1.

In accordance with the present invention, the resistor comprises an insulating support, a pair of spaced terminals carried by said support. Located between said terminals, in parallel arrangement, are a low resistance film and a high resistance film. Adjacent boundaries of the films are in electrical communication along the full length thereof. The resistor is adapted for fine and accurate adjustment in value by removal of resistance material beginning with the low resistance film.

Referring to the drawing for a more detailed description of the resistor of the present invention, the component **10** comprises an insulating substrate **11** upon which is positioned a pair of spaced electrodes **12** and **13**. Between the electrodes and in parallel arrangement are low resistivity zone **14** and high resistivity zone **15**. The two zones or films are in electrical communication along their entire adjacent boundary. As shown, the boundary is a sawtooth configuration. This tends to distribute any so called "hot spots" which may occur at the boundary over a greater area. While this is a preferred configuration for the boundary, it is to be understood that a curved, parabolic, V-shaped, rickrack, etc., boundary is also contemplated.

Example

On a 1 x 1 x .025 inch plate of alumina is deposited a pair of spaced silver electrodes. Deposited over and between the electrodes, as shown in FIGURE 1, are two adjoining coplanar resistance films, one a relatively low resistivity zone of about 400 ohms/square, the other a relatively high resistivity zone of about 4000 ohms/square. The over-all resistance of the unit is about 500 ohms. This resistor can be critically trimmed to any value up to about 1500 ohms by successive removal of part of the low resistivity zone.

When the transition (sawtooth) area is reached, the sawtooth pattern insures that a gradually increasing proportion of high resistivity material is removed, and there is no abrupt change in the resistance as trimming proceeds. A precise value can thus be obtained, and this value can be as high as 8,000 ohms, with from 25 to 33% of the original resistor width still remaining.

The substrate material is not critical. Any appropriate ceramic or refractory material can be employed e.g. barium titanate, alumina, porcelain, steatite, glass, etc. The shape of the substrate need not be a plate, it may be a rod, tube, triangle, etc.

The resistor material likewise is not critical. It can be any of the commercially available resistor compositions, e.g., carbon compositions, metals, alloys, oxides, etc. The selection of the appropriate low and high resistivity material will, of course, depend upon the end resistance value desired. Normally, the low resistivity material will have a value of between about 100 to about 4000 ohms/square and the high resistivity material will be upwards of about 4000 ohms/square.

Since it is obvious that many changes and modifications can be made in the above-described details without departing from the nature and spirit of the invention, it is to be understood that the invention is not limited to said details except as set forth in the appended claims.

What is claimed is:

1. A resistor comprising an insulating support; a pair of terminals carried by said support; a low resistance film is coplanar with a high resistance film on said support; each of said films extend between and in contact with both of said terminals in a parallel arrangement; adjoining boundaries of said films are in electrical and physical connection along the full length thereof; said adjoining boundaries are such that said low resistance film projects into said high resistance film at intervals for fine and accurate adjustment over a wide range of values by removal of resistance material beginning with the low resistance film.

2. The resistor of claim 1 wherein the projections define a common sawtooth boundary between said films.

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