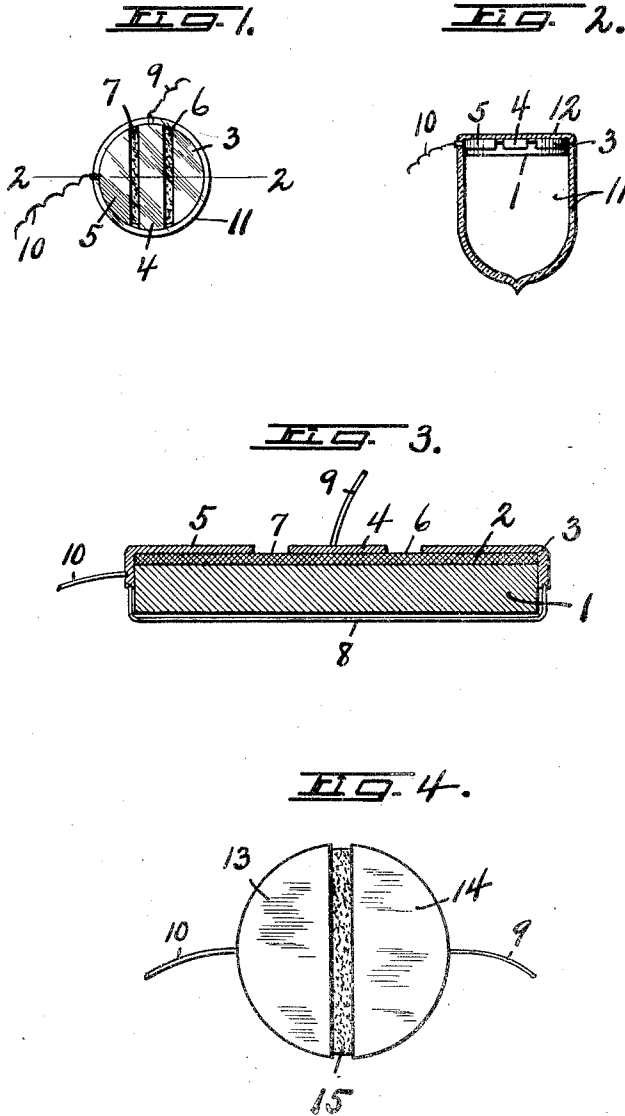


T. W. CASE.
 LIGHT REACTIVE RESISTANCE AND METHOD OF FORMING SAME.
 APPLICATION FILED APR. 5, 1918.

1,316,350.

Patented Sept. 16, 1919.



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 BY
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UNITED STATES PATENT OFFICE.

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LIGHT-REACTIVE RESISTANCE AND METHOD OF FORMING SAME.

1,316,350.

Specification of Letters Patent. Patented Sept. 16, 1919.

Application filed April 5, 1918. Serial No. 226,906.

To all whom it may concern:

Be it known that I, THEODORE W. CASE, a citizen of the United States of America, and resident of Scipio, in the county of Cayuga, in the State of New York, have invented new and useful Improvements in Light-Reactive Resistances and Methods of Forming Same, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain new and novel light reactive resistance elements and to the materials from which the same are formed and the method of forming the same and in certain respects is closely related to my copending application Ser. No. 195,653.

As illustrative of one particular use for which my invention is specially adapted, reference is hereby made to my copending applications, Ser. Nos. 213,225 and 218,308 respectively.

I have discovered that a material comprising or consisting of an oxidized compound of thallium and sulfur can be utilized as a portion of an electric circuit and that its resistance to the passage of current through said circuit varies under the influence of light to effect a change of current in accordance with the intensity of the light rays to which the substance is subjected and that a thallium-oxy-sulfid is considerably more sensitive than an unoxidized compound of thallium and sulfur.

The oxidation may be effected in any suitable way as for instance by admitting a desired quantity of air to a vacuum vessel in which the thallium-sulfid may be dried after precipitation. The compound seems to assume its most sensitive form when only slightly oxidized. I desire therefore, to claim thallium-oxy-sulfid as a light reactive resistance.

I have further discovered that the physical character or structure of the resistance element whether formed of the materials named or of other materials as set forth in my copending applications Ser. Nos. 195,653—

169,111—149,704—149,705 and 195,652 respectively has a very material and important bearing upon the sensitiveness of the resistance material. In my present method of manufacturing such element I provide a suitable supporting member for the resistance material. My experience leads me at present to prefer for this purpose a disk of quartz or silica which material may be subjected to relatively high temperature without change and without chemically varying the material of which the resistance element is formed. At any rate such a substance should be used as will not either in heated or unheated condition chemically vary the material of which the resistance element is to be formed as for instance, by absorbing sulfur from thallium-oxy-sulfid or vary or change in any harmful way the composite body of resistance material or any element thereof.

This disk is heated in any suitable way to such a temperature that the material from which the element is to be formed melts or partially melts or coalesces so that it is easily spread in a layer on a surface of the disk to form a unitary body of substantially uniform character. It will be apparent that this coalesced layer of light reactive material may be formed upon the disk in various ways as for instance by heating the disk to such a temperature that when the material comes in contact with the surface thereof, it is melted or fused or partially fused to a predetermined extent as desired, or the material and the disk may be heated in unison to effect the desired melting or fusion of the light reactive material without affecting the disk. The fused, partially fused or melted material may be spread in any suitable way upon the disk and is preferably immediately and rapidly cooled after proper formation of the layer.

Various materials require the application of various temperatures to effect the desired coalescence. These temperatures can be advantageously determined empirically in accordance with the material used and the operating conditions.

In the use of thallium-oxy-sulfid the temperature may vary greatly as from 450° C. to 700° C. or perhaps to a greater extent depending considerably upon the degree of oxidation and my experience at present is that oxidation has been carried to the most efficient extent when the required fusing or coalescence of the material is effected in the desired manner at approximately a temperature of 650° C.

In the drawings hereto annexed:—

Figure 1 is a plan view of a resistance element or cell.

Fig. 2 is a cross-section on line 2—2 Fig. 1 showing the resistance element proper in full.

Fig. 3 is an enlarged cross-section of the resistance element proper.

Fig. 4 is a plan view of a slightly different form of resistance element.

The resistance element or cell as shown in the drawing comprises a supporting disk or block —1— of suitable material as quartz or silica having formed thereon a layer —2— of suitable light reactive material. As shown in Figs. —1—, —2—, and —3—, the layer —2— is provided with suitable contact members —3—, —4—, and —5— of gold leaf or other suitable material preferably covering a portion of the surface of the layer —2— and leaving other portions —6— and —7— uncovered for exposure to light rays. The contacts may extend over the edges of layer —2— and block —1— and contacts —3— and —5— may be connected in series in any suitable way as by conductor —8—. The line wire —9— may be connected to contact —4— while line wire —10— may be connected to either of contacts —3— or —5—. Such connection necessitates the passage of the current through either or both of the exposed portions —6— and —7— of the light reactive material. The construction so far described constitutes the light reactive cell proper.

I have discovered that, highly efficient results are obtained by inclosing this element or cell within a vessel as vessel —11— from which practically all moisture and if desired practically all air may be removed. When so inclosed the element is found to be more permanent in its physical and chemical nature, more sensitive in its action and practically uniform in such action for long periods of time. The permanency of the element may be somewhat attributed to the absence of moisture but the reasons why the element when so inclosed has the advantageous character described has not as yet been so definitely and accurately determined that it can be stated with assurity and positiveness and I am therefore content with the statement that such results are effected. Although the side —12— of vessel —11—

through which the light reactive material is exposed may as shown be perfectly flat yet it will be apparent that lenticular power may be given to this surface for concentrating the rays of light upon the resistance, should that be desired.

The construction shown in Fig. 4 is substantially the same as that shown in the former figures except that only two contacts —13— and —14— are used which contacts are separated by a single strip —15— of exposed light reactive material.

Although I have described certain structures and methods of producing the same as in my present experience highly efficient and perhaps preferable, I do not desire to limit myself to the same as various changes and modifications may be made without departing from the spirit of this invention as set forth in the appended claims.

What I claim is:

1. A resistance material comprising thallium-oxy-sulfid.

2. A resistance material formed of thallium-oxy-sulfid.

3. A resistance material comprising thallium-sulfid slightly oxidized.

4. A light-reactive resistance including a fused coherent body comprising thallium-oxy-sulfid.

5. A light-reactive resistance comprising a disk, a layer of coalesced light-reactive material on the disk, contacts partially covering the surface of the light-reactive material and spaced from each other.

6. A light-reactive resistance comprising a disk of material, of high silica content, a layer of coalesced light-reactive material on the disk, contacts partially covering the surface of the light-reactive material and spaced from each other.

7. The method of forming a light-reactive resistance comprising heating the resistance material to substantially a fusing temperature, shaping the heated material into a uniform layer, and immediately cooling the layer.

8. The method of forming a light-reactive resistance comprising heating a light-reactive material in contact with a supporting element, forming said material in a layer upon said element, and spreading contacts in spaced strips upon the surface of said layer.

9. The method of forming a light-reactive resistance comprising heating a light-reactive material in contact with a supporting element, forming said material in a layer upon said element, spreading contacts in spaced strips upon said layer, and inclosing said element in an air-tight vessel from which the moisture has been substantially removed.

10. A light reactive resistance element

comprising a supporting disk, a layer of
light reactive material thereon and strips of
material spread upon the surface of said
layer and spaced from each other and con-
stituting contacts.

In witness whereof I have hereunto set
my hand this 15th day of March, 1918.

THEODORE W. CASE.

Witnesses:

EARL I. SPONABLE,

BLISS S. CUSHMAN.

11. A resistance material comprising thal-
lium-oxy-sulfid under vacuum.