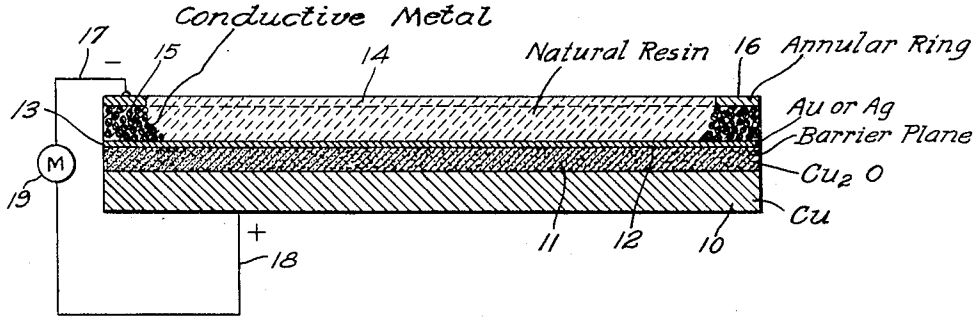
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PRESERVATIVE AND CONTACT COATING FOR LIGHT SENSITIVE DEVICES

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PRESERVATIVE AND CONTACT COATING FOR LIGHT SENSITIVE DEVICES

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My invention relates to preservative coatings and especially to preservative coatings for light-sensitive devices.

It is an object of my invention to provide a preservative coating for light-sensitive devices and in particular for light-sensitive devices of the copper oxide type.

Another object of my invention is to provide a coating for a light-sensitive device of the copper oxide type which has a conductive portion therein for the purpose of making an electrical contact with the device.

As stated above, the invention has particular application to the copper-oxide type of cell and especially to the particular type of copper oxide cell which I designate as having a front-wall effect, namely, one in which the light causes an emission from the copper oxide to a translucent or transparent conductive material superimposed thereon. In operation I have found that the translucent material being very thin is apt to be damaged by handling or by improper contact with other objects.

Furthermore, the conductive metal which is preferably of the noble metals, silver, gold or platinum, is acted upon chemically if exposed for a long time to the atmosphere. The result is that the cells rather rapidly lose their sensitivity. Accordingly, I have devised a coating for these light-sensitive cells that will protect the noble metal conductive film from chemical action, from mechanical contact and which will preserve the sensitivity of the cell to light. I also have devised how to make electrical contact at certain portions through the protective layer to the noble metal without exposing the noble metal film to the atmosphere or to the direct pressure of a metal connector.

Other objects of my invention will become apparent upon reading the following description and drawing wherein the single figure is a cross section through a light-sensitive cell having my preferred form of preservative and contact coating thereon.

As previously explained, my invention is particularly adapted for the copper oxide type of light-sensitive device. The copper oxide light-sensitive device is, of course, formed preferably from a copper disk 10 by oxidizing one surface thereon as a layer of copper oxide in the cuprous form. Instead of utilizing the type of cell in which the action takes place between the copper oxide and the copper, I prefer to use what I designate as the front-wall or obverse type of copper oxide cell. This particular type of cell is specifically described in my Patents 2,095,781, 2,095,782 and 2,095,783 granted Oct. 12, 1937. The copper oxide 11 is formed on the copper disk at such a depth that the copper oxide is substantially opaque in order to prevent any response to light at the juncture between the copper oxide and copper. It is also possible that the temperature at which the copper oxide is formed on the copper helps in destroying the response in respect to light between the copper oxide and the copper. As explained in the applications previously referred to, I bombard the surface of the copper oxide to produce a barrier plane 12 of a polarized gas thereon and then evaporate a translucent film of noble metal 13, namely, silver, or gold or platinum thereon. This translucent film may, of course, be thin enough to be also transparent. I have found that in operating the device the cell rather rapidly loses a large portion of its initial sensitivity and the noble metal is apt to be damaged by handling or by exposure to the atmosphere with a consequent chemical action.

Furthermore, electrical metal contact members on the noble metal film would wear through the noble metal and make contact with the copper oxide. Accordingly, I have devised a preservative film that makes contact to the translucent metal without chemical or mechanical contact damage thereto.

For this protective film, I prefer to use a resin coating and preferably the class of resins known as natural resins or gums. Preferred specific materials in this class of natural resins are rosin collophony, abietic acid, ester gum or glycerized rosin. By use of this protective coating, I prevent the deterioration of the cell.

I found, however, that it was advisable to improve the coating so that it would be more flexible and tougher at lower temperature and that it would stand a low temperature without cracking. Accordingly, I prefer to use one or more of the well known group of plasticizers in the natural resin coating. These plasticizers are preferably of the waxes or glycerin type and may be preferably of beeswax although paraffin, Japan wax, normal butyl phthalate, ethylene or other glycols are readily available. The proportion of the plasticizer depends upon the temperature range to which the device may be subjected. The plasticizer can extend from 2% to 25% of the natural resin coating, but this range can be limited to 5% to 15% for Northern United States and I have found that 12½% of plasticizer works excellently.

Some of the cells I noticed have lost as much as 25% of their original sensitivity in a day but the application of this preservative coating successfully prevented this former rapid deterioration of sensitivity.

Electrical contact to the noble metal film had been made by use of copper fingers bearing upon the edge of the noble metal film. These copper fingers caused wear of the noble metal at this particular place and short circuits resulted when the copper fingers wore through to the copper

oxide. Furthermore, the noble metal was exposed to the atmosphere about the section in which the electrical contact was made by means of these copper fingers. Accordingly, I devise means for making electrical contact to the noble metal film through the natural resin preservative layer 14. To do this, I take a conductive metal such as silver or zinc and granulate it. The metal may be of any desired shape of powder such as fine granules or even flaked. I prefer, however, to sift the metal through a mesh of from 50 to 200 fineness. The powdered metal can be sifted upon the surface of the natural resin and preferably restricted to the portion represented by the rim or circumference region 15. This powdered metal will sink through the fluid resin upon application of heat to about 100° C. and make contact with the gold or silver film and then fuse or cohere with the resin into a conducting ring. Carbon can also be used. As an alternative method, I prefer to use one of the well known low melting alloys that has a melting point from 60° to 150° C. These low melting alloys are given in standard handbooks such as page 670 of the 1933 edition of Handbook of Chemistry and Physics, published by the Chemical Rubber Publishing Company of Cleveland, Ohio. The particular alloys in this handbook have been designated as the bismuth alloys and one in particular that is especially suitable is an alloy of 53% bismuth, 32% lead and 15% tin with a melting point of 96° C.

The powdered natural resin and its plasticizer is spread over the noble metal surface of the copper oxide disk and then the powdered low melting alloy is spread around the desired contact area on the rim or edge of the natural resin powder. The disk is then placed on a hot plate heated to a temperature of about 135° C. The resin and plasticizer fuses to a clear liquid in the central portion of the disk and the low melting alloy and the rosin fuse together to make a conductive contact carrier with the noble film.

An annular ring 16 of any suitable conductive metal such as tin or lead or zinc and preferably tin plated steel makes contact with the conductive portion 15 of the preservative coating.

Any suitable type of connection can then be made to the annular ring 16 and to the copper base 10 without disturbing the sensitive portions of the cell. These connections 17 and 18 may extend to a light meter 19 for example.

The cell, as disclosed, is a self-generating cell of electricity in response to light acting upon the copper oxide and releasing electrons therefrom through the barrier plane to the noble metal film. The electrical connections from the negative electrode (the noble metal) through the low melting alloy or other metal to the annular ring 16 provide the negative terminal of the cell and the copper on the other hand is the positive terminal. The cell develops electricity at approximately 3/10 of a volt and the current depends upon the strength of the light energy received. It is to be noted that the cell does not require an outside source of electricity.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art.

I claim as my invention:

1. A photo-sensitive device comprising copper having a portion of its surface oxidized, a translucent metallic coating upon said oxide, and a preservative and contact coating for said metallic coating consisting of a layer of a natural resin with a conductive alloy at certain portions only, said alloy extending through said resin and having a melting point between 60° and 125° centigrade, said metallic coating and resin coating having sufficient area clear of said alloy for the passage of light therethrough for the actuation of the device.

2. A photo-sensitive device comprising a copper oxide layer having a translucent conductive film thereon, a natural resin layer fused on said conductive film and a conductive material at a certain portion only in said natural resin making electrical contact through said natural resin to said conductive film, said conductive film and said natural resin layer having sufficient area clear of said alloy for the passage of light therethrough for the actuation of the device.

3. A photo-sensitive device comprising a copper oxide layer having a translucent conductive film thereon, a natural resin layer on said conductive film and a conductive material fused at a certain portion only of said natural resin layer extending through said resin layer and making electrical contact with said translucent conductive film, said conductive film and said natural resin layer having sufficient area clear of said alloy for the passage of light therethrough for the actuation of the device.

4. A photo-sensitive device comprising a copper oxide disk having a translucent conductive film thereon, a natural resin layer fused on said conductive film, and a conductive metal fused with the natural resin and extending through the thickness of said resin around the rim portion of said disk.

5. A photo-sensitive device comprising a copper oxide disk having a translucent conductive film thereon, a natural resin layer fused on said conductive film, and a conductive metal fused with the natural resin and extending through the thickness of said resin around the rim portion of said disk and a conductive ring superimposed on the conductive metal and natural resin.

6. The method of providing a coating for a photo-sensitive device which comprises spreading over the surface that will receive the light signal, powdered natural resin and heating the resin until it fuses thereon.

7. The method of providing a coating for a photo-sensitive device which comprises spreading over the surface, that will receive the light signal, powdered natural resin and plasticizer and applying heat until they fuse thereon.

8. A photo-sensitive device comprising copper having a portion of its surface oxidized, a translucent metallic coating upon said oxide, and a preservative coating fused thereon consisting of a natural resin plasticized with a wax from the group consisting of paraffin, Japan wax, normal butyl phthalate and ethylene.

9. A photo-sensitive device comprising copper having a portion of its surface oxidized, a translucent metallic coating upon said oxide, and a preservative coating fused thereon consisting of a natural resin selected from the group consisting of rosin, collophony, abietic acid, ester gum or glycerized rosin and plasticized with a wax from the group consisting of paraffin, Japan wax, normal butyl phthalate and ethylene.

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