

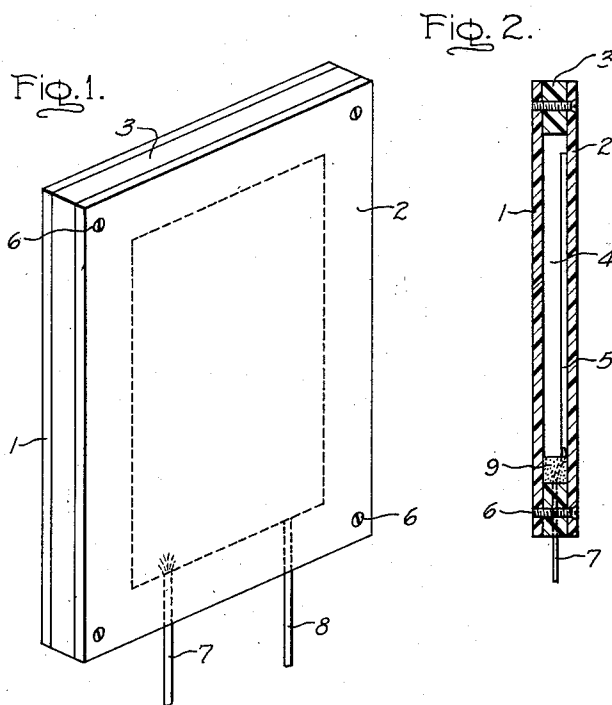
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ENCASED ELECTROLUMINESCENT DEVICE

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ENCASED ELECTROLUMINESCENT DEVICE

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1 Claim. (Cl. 313—108)

This invention relates to indicating or other devices of an illuminating character employing an electroluminescent material, that is to say, a material which luminesces when subjected to the action of a varying electrostatic field.

Materials of this kind, of which a phosphor comprising zinc sulphide and zinc oxide activated with a compound of copper and utilizing an alkali metal phosphate as a flux may be cited as an example, are adversely affected by the presence of water vapor. Consequently, if a useful life is to be expected from an indicating or other illuminating device utilizing such an electroluminescent material, precautions must be taken to minimize the possibility of water vapor coming in contact with the material.

The object of the invention is to provide an improved electroluminescent device construction which eliminates or substantially reduces the deleterious effects of moisture.

According to the invention the electroluminescent layer forming part of an illuminating device is enclosed in a sealed casing of which at least the side through which light emission from the material, when energized, is to be visible is made of a light transmitting material, the casing containing a desiccating agent, such as silica gel, to absorb moisture which may be trapped within the casing when it is sealed off.

The body of the casing may be made of any suitable material. The light transmitting material from which is made the front side through which light emission is to take place may be glass or conveniently a transparent plastic such as polythene (polyethylene) or acrylic resin. The rear side need not be transparent; however, these same materials are also suitable for use in making the body of the casing, and we may use polyethylene or an acrylic resin for the whole of the casing. The parts can be sealed together by dissolving the surfaces to be joined with chloroform or other suitable solvents for the plastics and applying pressure, or by applying a suitable adhesive. The join should finally be coated with an adhesive or varnish impermeable to moisture as a secondary seal.

The accompanying drawings illustrate the manner in which an illuminating device employing an electroluminescent material may be constructed in accordance with the invention, Fig. 1 being a perspective view and Fig. 2 a cross section.

Referring to the drawings, the casing containing the electroluminescent indicator, and made from an acrylic resin or polyethylene, is shown as constructed of a pair of rectangular sheets 1, 2 separated by a rectangular spacer 3 so as to provide a hollow space 4 for the reception of the electroluminescent indicator 5. The parts of the casing are sealed together with a suitable adhesive, and may be held together with screws 6 as an additional precaution. The seal is preferably coated with the moisture impermeable adhesive or varnish. As is readily seen in the drawing, the casing is relatively flat; the linear dimensions of the sheets, that is, their width and length, are much greater than their spacing apart or the depth of the casing.

2

The electroluminescent indicator 5 may conveniently be carried on the light transmitting sheet 2 forming the front side of the casing. Thus the sheet 2 may constitute the member on which an electrically conducting and light-transmitting film is formed and on which film is located the layer of electroluminescent material, comprising zinc sulphide and zinc oxide activated as aforesaid. For a description of a suitable method of preparation of electroluminescent phosphors, reference may be made to pending application, No. 317,613, filed October 30, 1952, of Shepard Roberts, entitled, "Electroluminescent Devices," and assigned to the same assignee as the present invention. The layer of electroluminescent material is in turn covered with a second electrically conducting film, for instance evaporated aluminum. The first and second conducting films are connected to conductors 7, 8, respectively. These conductors are led out from the casing and enable the required alternating potential to be applied to the electroluminescent material. The outlet of the lead wires through the casing should be sealed with a suitable material, impermeable to moisture. Insulating films may intervene between the electroluminescent material and the conducting films if desired. Such insulating films should have a high dielectric constant: a suitable material is nitrocellulose.

In an alternative construction, a complete electroluminescent panel built up on a separate transparent conducting sheet, for instance a piece of conducting glass, may be placed inside the casing, with the active side of the panel facing the transparent side of the casing.

The casing contains a small quantity 9 of a desiccant such as silica gel to absorb any water vapor that may remain in the casing when the parts of the casing are secured together by the adhesive. The desiccant also absorbs any humidity that may leak or diffuse into and penetrate the casing during the life of the device. Thus a dry atmosphere is maintained within the casing and diminution in electroluminescence as a result of deleterious action of moisture on the material is eliminated or substantially reduced.

While a certain specific embodiment of the invention has been shown and described, it is intended as an illustrative example only of the invention. Various modifications will readily occur to those skilled in the art and the appended claim is intended to cover any such modifications coming within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

An electroluminescent device comprising a flat sealed casing having front and back sides with linear dimensions substantially greater than the depth of said casing, said front side being light transmitting and at least part of said casing being of plastic material not entirely impervious to diffusion of moisture therethrough, a first transparent conductive film on the inner surface of the front side, a layer thereover of an electroluminescent phosphor of a type adversely affected by moisture, a second conductive film thereover, lead wires sealed into said casing and connected to said conductive films, said casing having a depth providing an air space between said second film and said back side, and a desiccant non-reactive with said electroluminescent layer and conductive films and the material of the casing enclosed within said casing and filling a portion of said air space to reduce the deleterious effects of moisture on the electroluminescent layer.

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