

July 20, 1954

E. L. MAGER ET AL
ELECTROLUMINESCENT LAMP

2,684,450

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Fig. 1

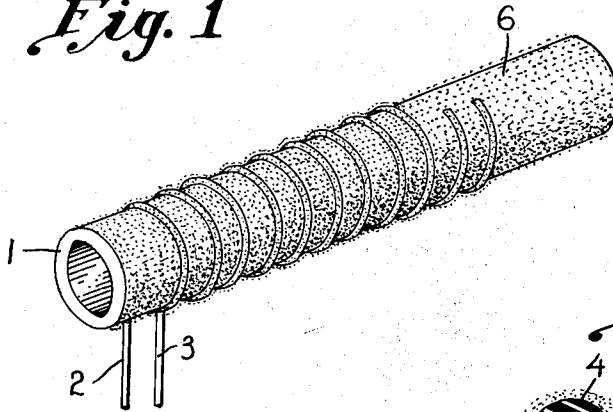


Fig. 2

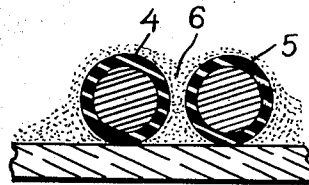


Fig. 3

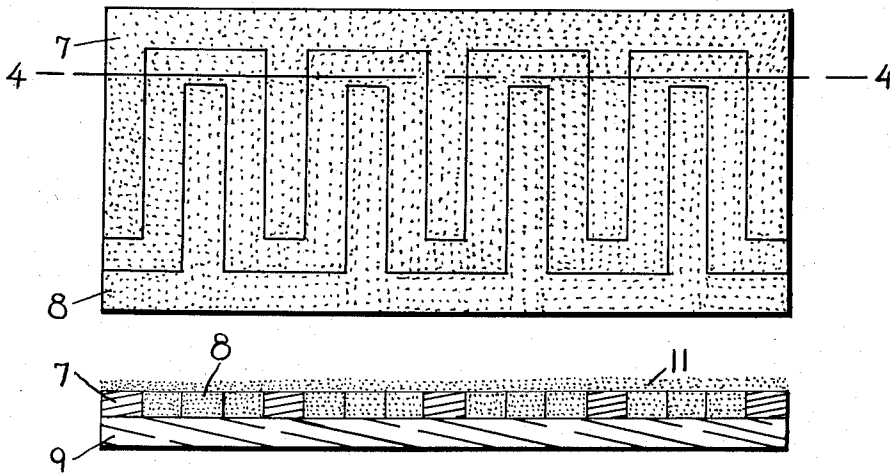


Fig. 4

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ELECTROLUMINESCENT LAMP

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6 Claims. (Cl. 313-108)

1

This invention relates to electroluminescent lamps and particularly to such lamps having a luminescing material in an electric field, for example between the plates of a condenser.

An object of the invention is the production of light by excitation of a luminescent material by an electric field.

An advantage of the invention is the production of light from the luminescent material directly by the field, without the intermediary of a gaseous discharge of the nature used in ordinary fluorescent lamps, and without requiring a transparent electrode to transmit the light produced by the action of the field on the phosphor.

A feature of the invention in its broader aspects is a spaced pair of parallel conductors with a luminescent material therebetween, either directly between the conductors or with a layer of dielectric material between it and one or more of the conductors.

Other objects, advantages, and features of the invention will be apparent from the following description, taken with the accompanying drawings in which:

Fig. 1 is a perspective view of one embodiment of the invention;

Fig. 2 is a longitudinal section, to a larger scale, through the same device;

Fig. 3 is a view of another embodiment of the invention; and

Fig. 4 is a longitudinal section on line 3-3 in the preceding figure.

In Figs. 1 and 2, an insulating tube 1, for example, a hollow tube of glass, has wound thereon a pair of wires 2, 3 spaced a short distance from each other, the wires being close together and side by side, that is parallel to each other. An enamel or other insulating coating 4, 5 may be present on each wire, although this may be omitted if other provision is made to prevent flash-over between wires. A phosphor coating 6 is placed over and between the wires.

The phosphor may be any material which emits light on excitation by an electric field, for example, a fired mixture of 75% zinc sulphide and 25% zinc oxide, activated by small amounts of halogens, copper and/or lead. Such a phosphor is shown in the co-pending application Serial No. 105,803 of Elmer C. Payne, filed on July 20, 1949, and other phosphors shown in that application may also be used. If desired, the wires may be wound in a flat spiral instead of a helix, and then placed on a flat sheet of glass, or otherwise arranged in a manner to hold its spacing.

In the foregoing I have, of course, used the word "wires" a generic term to include not only wires of round, but also of square or other cross-section, such as thin strips.

2

In Fig. 4, two intermeshed metallic grids 7, 8 may be printed on an insulating plate 9, for example of glass, or may be deposited by sputtering, electrodeposition or the like, or in any convenient manner. A thin coating of insulating material 10 may be placed over the metal, and the phosphor layer 11 coated on top of that.

When a sufficient difference of potential is placed between the wires 2, 3 or the grids 7, 8 the phosphor 6, 11 will emit light. The light will be emitted only when the potential is varied, so we prefer alternating current for excitation of our device. With direct current, light is emitted only when the voltage is applied and removed.

The spacing between the wires 2, 3 or grids 7, 8 is exaggerated in the figures for greater clarity, and should generally be quite small, and with round wires, as in Fig. 2, coated with insulation 4, 5 the insulating layer may be permitted to touch in some cases.

What we claim is:

1. A luminescent lamp consisting essentially of two metal conductors, each very long in comparison with its thickness and width, side by side and close together but spaced apart, and an electroluminescent phosphor therebetween.

2. A luminescent lamp consisting essentially of two closely-spaced parallel wires and an electroluminescent phosphor therebetween.

3. A luminescent lamp consisting essentially of an insulating plate, two intermeshed but spaced grids fixed thereon, and an electroluminescent phosphor coating therebetween and thereover.

4. An electroluminescent lamp consisting essentially of two opposed metallic sets of teeth, the teeth of one set intermeshed with but spaced from the teeth of the other set, and an electroluminescent phosphor in the spaces between the teeth.

5. The lamp of claim 4, in which the teeth are printed onto an insulating plate.

6. The combination of claim 2, in which there is a coating of insulation around the wires.

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