

Dec. 4, 1956

T. EDMONDS
ANIMATED DISPLAY DEVICE

2,773,216

Filed Jan. 9, 1953

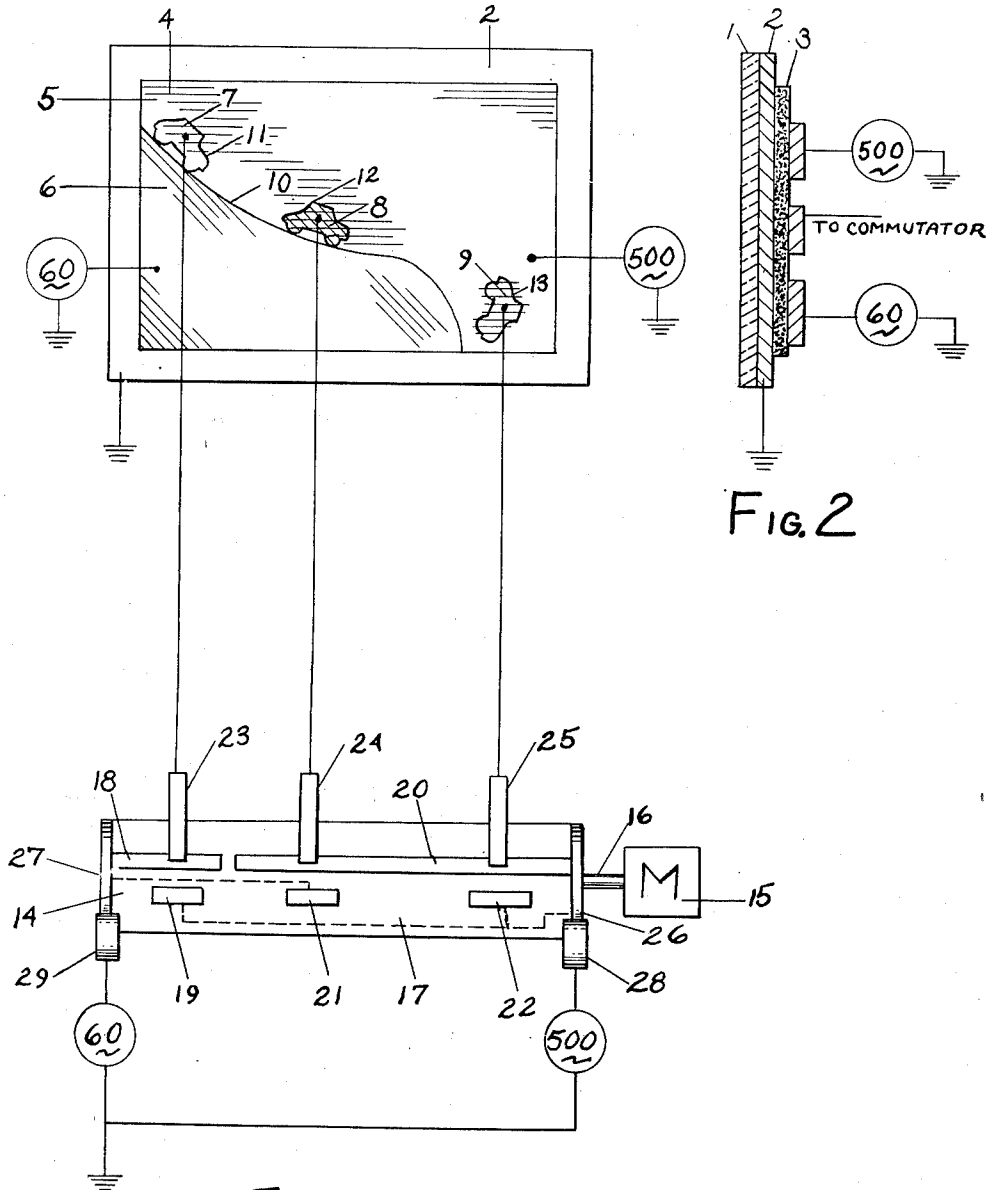


FIG. 1

FIG. 2

THEODORE EDMONDS,
INVENTOR.

BY *Lawrence Burns*
ATTORNEY.

1

2,773,216

ANIMATED DISPLAY DEVICE

Theodore Edmonds, Danvers, Mass., assignor to Sylvania Electric Products Inc., Salem, Mass., a corporation of Massachusetts

Application January 9, 1953, Serial No. 330,513

11 Claims. (Cl. 315—169)

This invention relates to electroluminescent display devices.

Electroluminescent lamps generally comprise a layer of electroluminescent phosphor, or of phosphor embedded in a dielectric material, between two electrodes which can be connected to an appropriate source of voltage, the layer containing the phosphor being referred to herein as a screen. One such lamp is shown, for example, in U. S. Patent 2,566,349, issued September 4, 1951, to Eric L. Mager.

An object of the present invention is the production of a pattern on such a screen.

Another object is to make the pattern variable, and a particular object is to make it variable in color.

In one embodiment of the invention, these results are achieved by coating a piece of so-called conducting glass with a layer of phosphor embedded in a dielectric material, and making the other electrode a conductive coating over said phosphor layer and formed into the desired pattern. If the pattern contains two electrically insulated coatings, and the phosphor used is one whose color changes with frequency, such as the copper and lead activated zinc sulphide of copending application Serial No. 180,783, filed August 22, 1950, by Elmer C. Payne, then one of the coatings will luminesce one color if connected to low frequency, such as 60 cycles per second, and the other coating will luminesce another color if connected to a higher frequency, such as 500 cycles or more per second. The color of either or both coatings can be changed, for the same phosphor, by changing the frequency.

If the coating is divided into several areas, insulated from each other, then the color of any or all of the areas can be changed. For example, if the coating consists of a general background area, with several other areas spaced apart from it laterally in the form of a series of figures of some sort, then a figure can be made to seem to move from one position to another, by switching the figures in sequence from one frequency to the other.

Other objects, advantages and features of the invention will be apparent from the following specification, taken in connection with the accompanying drawings, in which Fig. 1 is a back view of one embodiment of the invention, showing the pattern of the coating on the back, and its connections to the power source; and Fig. 2 is a side view of the lamp of said device.

In the figures, the glass plate 1 carries the transparent conductive coating 2 of stannous chloride or the like, as is now well-known in the art, thus forming a so-called conducting glass. A coating 3 of a mixture of phosphor and dielectric material, such as shown for example in copending application Serial No. 230,596, filed June 8, 1951 by Lowry, Mager and Butler, is placed over the conductive coating 2, which is at ground potential. The metal coating 4, broken up into the areas 5, 6, 7, 8, 9, which are spaced from each other by an amount sufficient to electrically insulate them from each other by the spacing

2

shown as lines 10, 11, 12, 13, is placed over the phosphor-dielectric coating 3.

In the particular embodiment shown, a copper and lead activated electroluminescent zinc sulfide is used as the phosphor, and the metal area 6 is then connected to a potential of low frequency, say 60 cycles per second, to luminesce green, representing a grass-covered hill, for example, and the area 5 is connected to a potential of 500 cycles or higher, to represent the sky. The areas 7, 8 and 9 which represent a car in successive positions going down the hill and out into space, will then be connected to a potential of 60 cycles per second when the car is to be shown and to a source of 500 cycles per second when the car is not to be shown. Thus by connecting area 7 to a potential of 60 cycles per second, the pattern of a car appears in area 7 and it will not appear in the areas 8 and 9 if the latter are at that time connected to a potential of 500 cycles per second, so that areas 8 and 9 fade into the background of blue area 5. If then the area 7 is switched to 500 cycles, the car disappears there, and if the area 8 is changed to 60 cycles the car appears in area 8, as if it had moved downward from 7 to 8. By then switching area 8 to the higher frequency and 9 to the lower, the car will appear to move to position 9, as if it had jumped off the hill and out into space.

The area 6 is permanently connected to a 60-cycle source to represent the green hill, and area 5 to 500 cycles to represent the blue sky. The potentials of the areas 8, 9 and 10, representing the car, are switched from one frequency to another by the commutator 14, rotated by the motor 15, the two being connected by the shaft 16. The commutator drum 17 is of insulating material with the metal segments 18, 19, 20, 21, 22 set therein in position to contact the brushes 23, 24, 25, connected respectively to areas 7, 8, 9 of the lamp. The segment 20 is long enough to contact both brushes 24 and 25, and segments 19 and 22 are connected together inside the drum 17. Rings 26 and 27 extend around the circumference of drum 17, ring 26 being connected to segments 19, 20 and 22, and ring 27 to segments 18 and 21. Brushes 28, 29 bear, respectively, on rings 26, 27, connecting the latter, respectively, to sources of power of 500 cycles per second and of 60 cycles per second, as shown, the other sides of the lines being grounded for convenience, or connected back to the transparent conduction coating 2. The commutator segments 18, 19, 20, 21, 22 for the first two steps of the car's progress are shown in the figure.

Although for convenience the invention has been described in connection with the particular embodiment above, its usefulness is more general, and it can be used in various places where a luminous pattern of more than one color is desired, or a pattern variable with time. The device can be used to present not only pictures, but also other information in the form of lettering, numbering or other symbols.

In the foregoing specification the frequency for the blue color has been taken as 500 cycles per second for convenience, but the light will ordinarily be much more blue if a frequency of 5000 cycles per second is used.

What I claim is:

1. An electroluminescent display device comprising a layer of electroluminescent material whose emission color varies with the frequency of the field applied thereto, at least one electrode on one side of said layer, and at least two electrodes on the other side of said layer and electrically insulated from each other.

2. The combination of claim 1, and means for supplying a potential of different frequency to each of said electrodes.

3. An electroluminescent display device comprising a layer of electroluminescent material whose emission color

varies with the frequency of the applied field, at least one electrode on one side of said layer and at least two electrodes on the other side of said layer and electrically insulated from each other, at least some of said electrodes being of transparent conductive material.

4. An electroluminescent display device comprising a layer of electroluminescent material whose emission color varies with the frequency of the field applied thereto, at least one electrode on one side of said layer, and a series of electrodes on the other side of said layer, each electrode in said series being insulated from at least some of the other electrodes in said series and being shaped to a predetermined pattern, and means for applying potential in sequence to some of the electrodes in said series.

5. An electroluminescent display device comprising a layer of electroluminescent material whose emission color varies with the frequency of the alternating potential applied thereto, at least one electrode on one side of said layer, and a series of electrodes on the other side of said layer, each electrode in said series being insulated from at least some of the other electrodes in said series and being shaped to a predetermined pattern, means for applying alternating potentials to said electrodes and means for sequentially changing the frequency of the potential applied to some of said electrodes in said series.

6. An electroluminescent display device comprising a glass piece, a transparent conductive layer on one side of said glass, a layer thereover of electroluminescent phosphor particles in a dielectric medium, and a series of metal coatings over said last-mentioned layer, each such coating being applied to a different area of said last mentioned layer and insulated from the coatings over at least some of the coatings over the other areas.

7. The combination of claim 6, and means for applying a potential sequentially to some of the coatings in the series.

8. The combination of claim 6, means for displaying a potential to at least some of the areas, and means for changing the frequency of the potential applied to some of the areas.

9. The combination of claim 6, in which the coatings in the series are arranged in a predetermined design.

10. An electroluminescent display device comprising a layer of copper-and-lead activated zinc sulfide electroluminescent material whose emission color varies with the frequency of the field applied thereto, at least one electrode on one side of said layer, and at least two electrodes on the other side of said layer and electrically insulated from each other.

11. An electroluminescent display device comprising a layer of electroluminescent material whose emissive color varies with the frequency of the field applied thereto, means for making electrical connection to one side of said layer, means for making electrical connection to a portion of the other side of said layer, and means for making electrical connection to another portion of said other side electrically insulated from said first-mentioned portion.

References Cited in the file of this patent

UNITED STATES PATENTS

1,779,748	Nicolson	Oct. 28, 1930
2,566,349	Mager	Sept. 4, 1951
2,624,857	Mager	Jan. 6, 1953
2,721,808	Roberts	Oct. 25, 1955