May 4, 1954 M. S. WETZEL 2,677,297

RHYTHMIC DECORATIVE LIGHTING APPARATUS

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FIG. 1

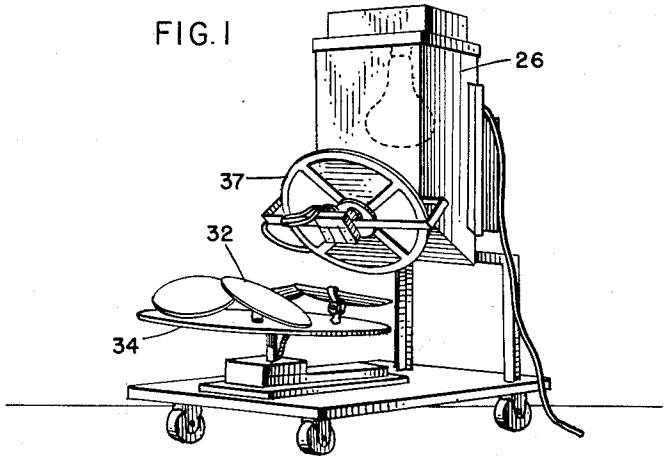


FIG. 3

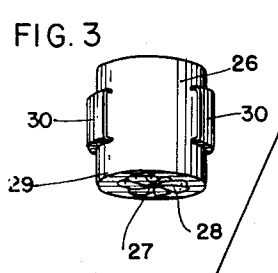
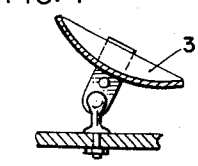


FIG. 2

FIG. 4



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RHYTHMIC DECORATIVE LIGHTING APPARATUS

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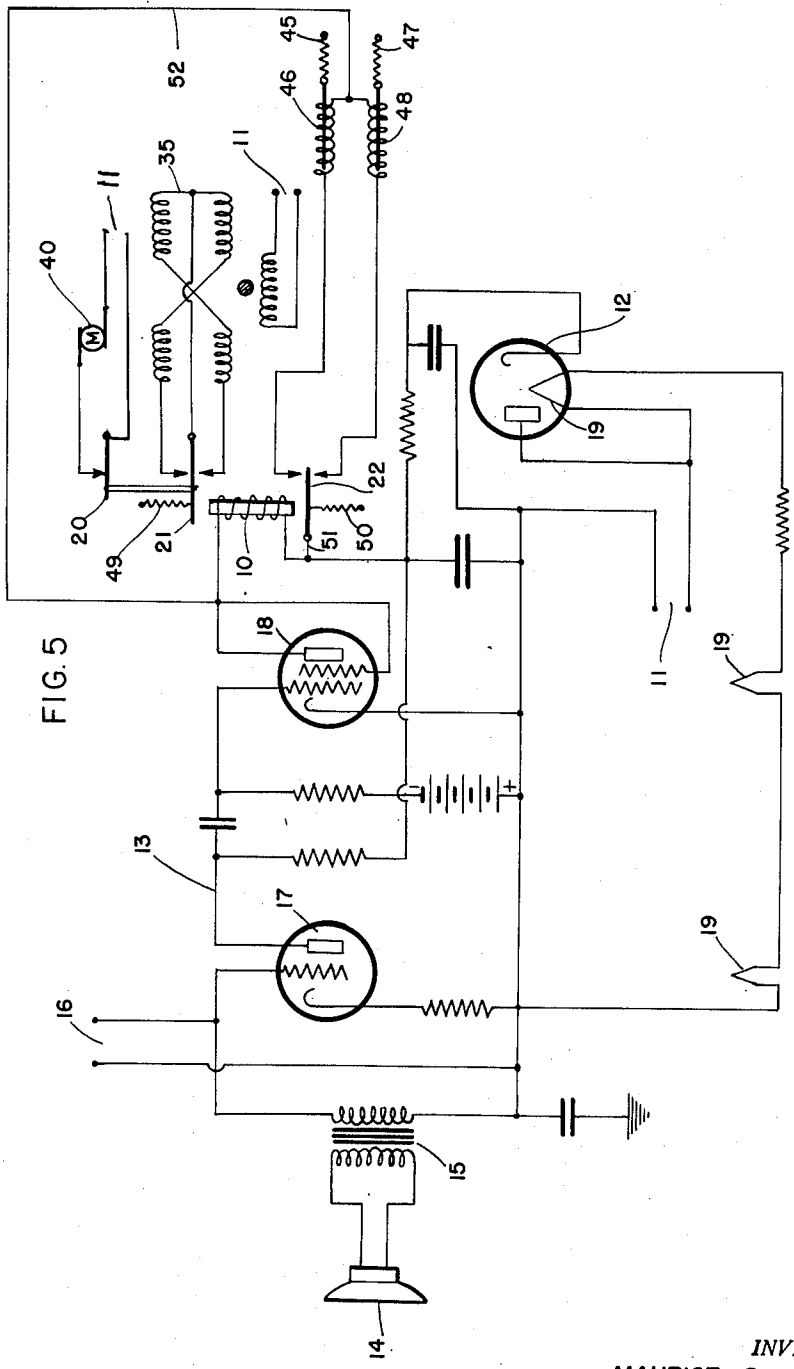

FIG. 5

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RHYTHMIC DECORATIVE LIGHTING APPARATUS

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Application February 19, 1952, Serial No. 272,367

3 Claims. (Cl. 84—464)

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This invention relates to apparatus for producing decorative lighting effects and is an improvement upon and carrying forward of the subject matter of my Patent No. 2,216,260, issued October 1, 1940, for Decorative Lighting Apparatus.

The main objects of the present invention are to provide an improved apparatus for producing moving and color-changing decorative patterns upon a light-reflecting or translucent screen that are directly influenced by sound variations; to provide an apparatus of this kind in which rhythmic color changes and movements of the decorative effects are so intimately related with sound effects as to be lyric in character when effected by a musical composition; and to provide an improved form of apparatus that embodies and is controlled by an amplifying electric circuit.

A specific embodiment of this invention is illustrated in the accompanying drawings in which:

Figure 1 is a perspective view showing the general arrangement of certain mechanical features of an apparatus for carrying out the invention in practice.

Fig. 2 is a schematic diagram showing the sequential arrangement of various mechanical elements of an apparatus, such as is shown in Fig. 1, for modifying and reflecting a beam of light from a filamentary light source so as to cast a modified image of such source upon a screen or wall.

Fig. 3 is a perspective view of the housing for the light source having an iris shutter for controlling the size of the optical image-producing light-emitting aperture.

Fig. 4 is a detail of a universal mounting for a concave mirror which directs the image toward the screen.

Fig. 5 is an illustrative form of vacuum-tube amplifying circuit arranged for controlling the various motor elements of the mechanical apparatus so as to modify the projected image in rhythmic relation to sound effects produced by a phonograph or public address system, or picked up by a microphone.

In the form shown in the drawings, the relay 10 is powered by an alternating current source connected to the terminals 11 through a rectifier tube 12 and under the control of an appropriate vacuum-tube amplifying circuit 13 for controlling the supply of electric current to the relay 10. The circuit 13 has its signal input controlled by a microphone 14 acting through transformer 15 or by the terminals 16 which may be connected to the sound sensitive circuit of a phonograph or public address system.

As will be understood by those skilled in the vacuum tube art, other forms of vacuum-tube amplifying circuits might be substituted for the specific circuit 13 which is a two-stage amplifying circuit including a triode 17 and a pentode 18. The filaments 19 of these tubes are shown apart

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from the tube symbols for the purpose of clarifying the circuit connections.

The relay 10 is of the double-pole, double-throw type equipped with multiple spring-urged switch arms 20, 21 and 22 arranged for opening and closing the circuits of motor elements that operate the various separate elements of the light projecting apparatus, as will be hereinafter described.

Referring now to Figs. 1 and 2 in which the corresponding parts are indicated by corresponding numerals, although these are shown in somewhat different shape and arrangement in the two views, the light source of Fig. 2 in an incandescent lamp 24, of which the filament 25 characterizes the image that is to be thrown upon the screen. The housing 26 encloses the light source and is provided with a light-transmitting aperture 27 controlled by an iris shutter 28 operated by a lever 29.

In order to avoid over heating, the housing 26 is provided with air vents covered by shields 30 to prevent the escape of light therefrom. The beam of light, indicated by arrows 31, casts an image of the filament 25 upon the curved mirror 32 which is tilted so as to transmit a reflected beam 31.1 toward a screen or wall 33, which is either of light-reflecting character or translucent, according to the side from which the projected image is intended to be viewed.

The image that is thrown upon the screen by the reflected beam 31.1 is characterized by the form of the filament 25 but is enlarged and distorted according to the form and disposition of the reflector 32. The reflecting mirrors are preferably concave and may be of spherical, parabolic, plane, cylindrical or conical curvatures, differing for varying the form of the image projected on the screen. In the diagrammatic view of Fig. 2, a plurality of such mirrors are mounted on a disk 34 which is rotated about a vertical axis and lies in a plane at right angles to the beam 31 of light issuing from the source. These are arranged on the disk so as to pass in succession into the path of the light beam and are of different curvatures so as to modify the image that is projected on the screen.

The disk 34 is rotated by a reversible motor 35 through speed-reducing gearing 36. Motion of the disk is variable but slow.

Means for producing different colors are provided in the form of a transparent disk 37 disposed at right angles to the light beam 31 and rotated by a shaft 38 through speed-reduction gearing 39 driven by a motor 40. The disk 37 has mounted thereon a plurality of differently colored filter panels 41 also, preferably of different shapes in somewhat kaleidoscopic relation to each other so that the exposure time of different colors may vary considerably.

Interposed between the filter bearing disk and the source of light, along the path of the beam

31, is an intersector plate 42 carried by an arm 43 pivoted on an axis 44 so as to move horizontally back and forth, and this plate is provided with alternating opaque and transparent areas so that in its movement, it will eclipse portions of the image-bearing light beam that is transmitted to the screen and add an additional factor of interest to the ultimate display. The arm 43 may be normally urged in one direction by a spring 45 and urged in the opposite direction by solenoid 46 that is sensitive to sound variations, as will appear.

The lever 29 which controls the iris diaphragm 28 for enlarging and reducing the light aperture 27 in the housing 26 is likewise normally urged in one direction by a spring 47 and pulled in the opposite direction to a variable extent by means of the solenoid 48.

In operation the magnetic strength of the core of the relay 10, being sensitive to the variations of current at the output end of the vacuum-tube amplifying circuit 31, has a varying effect upon the switches 20, 21 and 22 in opposition to the springs 49 and 50 so as to cause the armature arms to swing in a manner sensitive to the sound signal that produces current changes in the vacuum-tube amplifying circuit.

These motors 35 and 40, by reason of their speed-reduction gearing 36 and 39, turn the disks 34 and 37 at varying slow speeds. The motor 35 turns its disk in reverse directions according to the position of the switch arm 21 and the motor 40 runs or stops according to the position of the switch arm 20 without reversal. The motors 35 and 40 are directly connected to the source of alternating current 11.

According to the circuit shown in Fig. 5, the switch arm 22 actuates the solenoids 46 and 48 alternately as determined by the pull of the core of relay 10 upon the switch arm 22 opposing spring 50, but the power terminals 51 and 52 of these solenoids 46 and 48 are connected to the output end of the amplifying circuit so that the movements produced by the solenoids 46 and 48 will vary in degree, according to the sound intensity at the source of sound. The power terminals 51 and 52 may, if desired, be connected to the line circuit of the power terminals 11, in which case the throw of the solenoids 46 and 48 would be from one limit of movement to the other.

In the drawings, the apparatus has been illustrated with respect to a single source of light, transmitted in a single beam from a single aperture in the light housing; but it will be understood that several light beams from the same incandescent bulb might be simultaneously directed from different apertures in different directions so as to pass through respectively different portions of the disk 37 to different reflectors on the disk 34 to cast images simultaneously to different parts of the screen. Likewise, a bank of machines, such as are disclosed in Figs. 1 and 2, may be controlled by a single amplifying circuit merely by connecting the motor elements to a succession of machines in a manner similar to that disclosed in my said patent.

The usual commercial embodiment of this invention includes a bank of machines and is otherwise arranged to display a plurality of images upon the screen. Each image continuously varies in form, dimensions and color intensity due to the motion of the machine elements controlled by the amplifying circuit. Each image on the screen is a flowing mass of color

with light and shade and color changes traveling through it as if it were aflame. These movements and variations of color intensity are in synchronism with the decibel intensity of the sound that produces the signal current of the amplifying circuit.

Thus, when the signal is a musical composition rendered by a vocalist, orchestra, phonograph record or the like, the images on the screen seem to dance and swirl in rhythm with the music. The light effects have the same tempo as the music, visualizing the dance rhythm, waltz rhythm, march rhythm, or whatever may be the beat or inflection of the sound source that controls the amplifying circuit. The resulting effects are almost indescribable and must be seen in conjunction with the hearing of the sound in order to be appreciated.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A decorative lighting apparatus comprising a luminous filament of predetermined form, means for producing a beam of light for projecting an image of said filament on a remote area, a concave mirror located for movement in the path of said beam of light for variably reflecting said beam of light, motor means operatively connected to said mirror for moving same, and sound sensitive electrical means operatively associated with said motor means for varying the movement of said mirror in predetermined relation to the intensity of sounds affecting said sound sensitive means.

2. A decorative lighting apparatus, comprising a luminous filament of predetermined shape, a curved mirror, means for projecting a beam of light carrying an image of said filament to said mirror, mechanism connected to said mirror for moving said mirror to reflect said beam of light in varying directions, a source of sound, electrical motor means for operating said mechanism, a source of current for said electrical motor means, and a sound sensitive vacuum tube amplifying circuit interposed between said source of current and electrical motor means adapted to vary the current to said motor means through variations in the sound from said sound source.

3. A decorative lighting apparatus comprising a filamentary light source, a housing therefor having an aperture for directing a beam of light from said source, a concave mirror positioned at a distance from said aperture in the path of said light beam for reflecting an image of said light source upon a screen, an iris shutter adjacent said aperture for varying same, electrical motor means operatively connected to said shutter for adjusting same, and a sound sensitive vacuum tube amplifying circuit operatively connected to said electrical motor means for acuating said diaphragm in response to variations in intensity of sounds to which said amplifying circuit is subjected.

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