

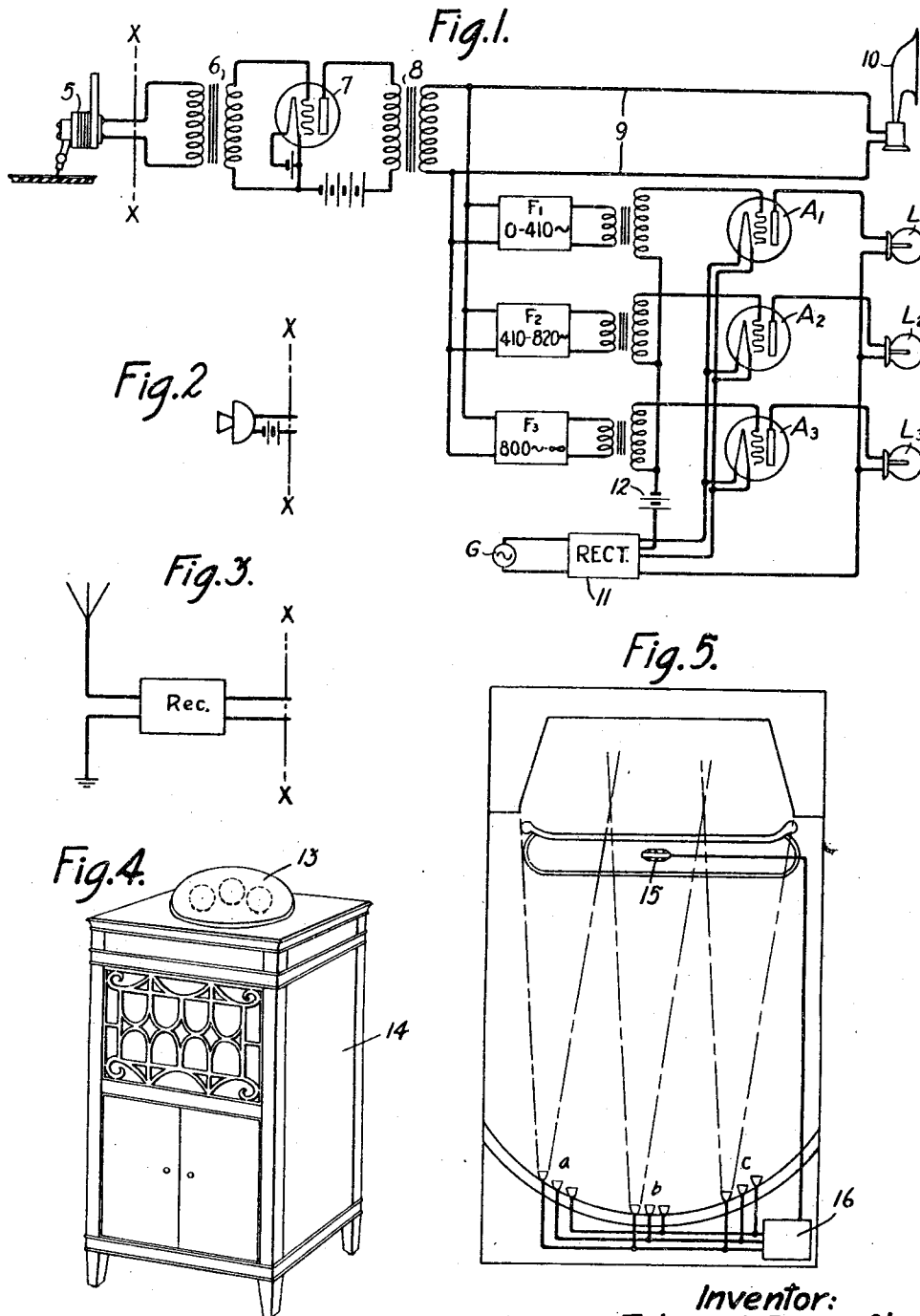
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APPARATUS FOR THE VISUAL INTERPRETATION OF SPEECH AND MUSIC

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE VISUAL INTERPRETATION OF SPEECH AND MUSIC.

Application filed October 6, 1925. Serial No. 60,715.

This invention relates to apparatus for the visual interpretation of acoustic effects such as are derived from electrical sound reproducing systems.

An object of the invention is to facilitate the coordination of light and sound.

A related object of the invention is to vary lighting effects in accordance with the characteristic frequencies and intensities of sound wave energy.

Another object of the invention is to utilize a portion of the energy in an electrical sound reproducing system to produce complementary tones and shades of light without impairing the quality or volume of the sound produced.

It is recognized that many articulate sounds are readily susceptible of interpretation by various tones and shades of color. Flood lights and other lighting effects, for example, are often employed to enhance the artistic effect produced by music, most musical compositions suggesting various degrees of light and color. The present invention provides a simple and inexpensive system for associating light and sound which is equally applicable to commercial and domestic use.

Briefly, the invention provides a coordinate system for producing lighting effects which blend in harmony with the articulate sounds produced by a phonograph or other sound reproducing system. The lighting system may include a plurality of colored lamps which are selectively controlled in accordance with the characteristic frequencies and intensities of the sound wave energy in an electrical sound reproducing system. If desired, the lamps may be associated with a diffusing device such as an opalescent globe or bowl to improve the color contrast accompanying the reproduced sound.

The various features and advantages of the invention will appear from the following description and the accompanying drawing, in which:

Fig. 1 is a circuit diagram of a phonograph reproducing system embodying the invention.

Figs. 2 and 3 are modifications, illustrating the adaptation of the system of Fig. 1 to loud speaking telephone and radio receiving systems, respectively.

Fig. 4 is a perspective view of a cabinet

phonograph equipped in accordance with the invention.

Fig. 5 is a diagram illustrating the application of the invention to the control of flood lights in theaters.

In the embodiment shown in Fig. 1, a phonograph reproducer 5 is coupled through a transformer 6 to an amplifier 7, the output of which is coupled through a second transformer 8 and circuit 9 to an electrically operated loud speaker 10.

The reproducer 5 may be of any suitable type, such as the electromagnetic reproducer disclosed and claimed in a copending application of H. C. Harrison, Serial No. 66,624, filed November 3, 1925. The reproducer when actuated by a phonograph record, as illustrated, generates electrical currents which drive the motor element of the loud speaker in accordance with the record. The volume level of the reproduced speech or music may be controlled in any well-known manner, as by adjusting the amplifier 7 to control the electrical input to the loud speaker.

A plurality of channels, including wave filters F_1 , F_2 , and F_3 , respectively, are bridged in parallel across the circuit 9. The output side of the filter F_1 is coupled to an amplifying detector A_1 , which may be of the space discharge type, having an incandescent lamp L_1 connected in its output circuit. Similarly, detector A_2 and lamp L_2 are connected in circuit with the filter F_2 , and detector A_3 and lamp L_3 are connected in circuit with filter F_3 .

The several wave filters employed in the system are designed to freely transmit a preassigned range of frequencies and to effectively suppress all frequencies lying outside of such range. Filter F_1 , for example, may be a low pass filter transmitting all frequencies from zero to 410 cycles, and suppressing all other frequencies. Filter F_2 may be of the band pass type, designed to transmit frequencies of 410 to 820 cycles, and filter F_3 may be a high pass filter transmitting all frequencies above 800 cycles. These filters may be designed in accordance with the principles set forth in the U. S. patent to Campbell, No. 1,927,113, issued May 22, 1917.

The generator G and rectifier 11 consti-

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tute a common source of space current and filament heating current for the amplifying detectors A_1 , A_2 and A_3 , and may also serve to supply energy to the lamps L_1 , L_2 and L_3 .

5 A grid polarizing battery 12 is connected in common to the cathodes of the several detector tubes.

In operation, a small portion of the energy in the circuit 9 of an electromagnetic loud
10 speaker of any well known construction will be selectively transmitted by one or more of the filters F_1 , F_2 and F_3 to the input circuits of the respective detectors, depending upon the frequency of the transmitting
15 energy. The space current thus produced in any of the detector circuits will cause the associated lamp in the plate-filament circuit to glow to a brilliancy depending upon the intensity of the energy impressed upon the
20 grid circuit. When no energy is transmitted to a given channel, the circuit conditions are preferably arranged to cause the associated lamp to remain dark.

It will be seen from the above that the
25 intensity of illumination may be varied in insensible gradations from a maximum brilliancy to complete darkness, blending gradually and continuously in harmony with the sound variations produced by the
30 loud speaker 10. If desired, furthermore, one or more of the lamps may be normally lighted to a predetermined minimum brilliancy in the manner disclosed and claimed in the D. G. Blattner, Patent No. 1,654,068,
35 issued December 27, 1927.

In the system described above, the lamp L_1 , which is controlled by the lower frequencies may be colored red, while the lamp L_2 , controlled by the intermediate frequencies, may be colored green, and the lamp L_3 , controlled by the higher frequencies, may be blue. These particular colors are arbitrarily associated with the various frequency
40 bands, but a definite relation may of course be established in keeping with the use to which the invention is put. It will also be understood that a greater variety of color tones can be obtained by employing a greater number of channels and differently colored
50 lamps.

The system of Fig. 1 may be employed in connection with public address systems by substituting a transmitter, such as is shown in Fig. 2, for the apparatus to the left of
55 the line X—X in Fig. 1. In such case, the system may be used to advantage in theaters and auditoriums in distributing flood lights or other lighting effects appropriate to the music or other program being produced.
60 The system of Fig. 1 may also be employed

in connection with the radio receiving circuit of Fig. 3 as an aid in the interpretation of programs received from radio broadcasting stations.

In Fig. 4 a plurality of electric lamps, 65 each controlled by a predetermined band of frequencies in accordance with the invention are clustered together inside an opalescent bowl 13 mounted on a cabinet phonograph
14. The lamps may also be mounted in 70 many other artistic arrangements which will readily occur to those skilled in the art.

Fig. 5 illustrates one manner in which the invention may be employed to automatically
75 distribute flood lights in harmony with orchestral music in a theater. A microphone 15 conveniently mounted in the orchestra pit, converts the sound variations into electrical waves which are transmitted to the common
80 collecting circuit 16. The circuit 16 consists of a plurality of channels each including a wave filter and associated detector similar to the arrangement shown in Fig. 1. If desired, a plurality of electric lamps may be
85 connected in multiple in the output of each channel, these lamps being arranged in groups a , b and c so that each lamp of a given group is controlled by a different band of frequencies. A uniform distribution of
90 illumination may thus be obtained by directing the light from the several groups of lamps upon different parts of the stage with the aid of suitable reflectors.

The invention is, of course, susceptible of various other modifications not specifically
95 referred to but included within the scope of the appended claims.

What is claimed is:

1. In a system for associating light and sound, a circuit including a source of electric waves, means for converting said waves
100 into audible effects, a plurality of paths connected with said circuit, a selective circuit in each of said paths for transmitting waves comprised within a predetermined range of
105 frequencies, and a source of light controlled by the energy in each of said paths.

2. In a system for associating light and sound, a circuit including a source of electric waves, means for converting said waves
110 into audible effects, a plurality of channels connected in parallel with said circuit, a wave filter in each of said channels for transmitting a predetermined range of frequencies, a space discharge device in each
115 of said channels, and an electric lamp in the output of each of said devices.

In witness whereof, I hereunto subscribe my name this 5th day of October A. D. 1925.

EDWARD B. CRAFT.