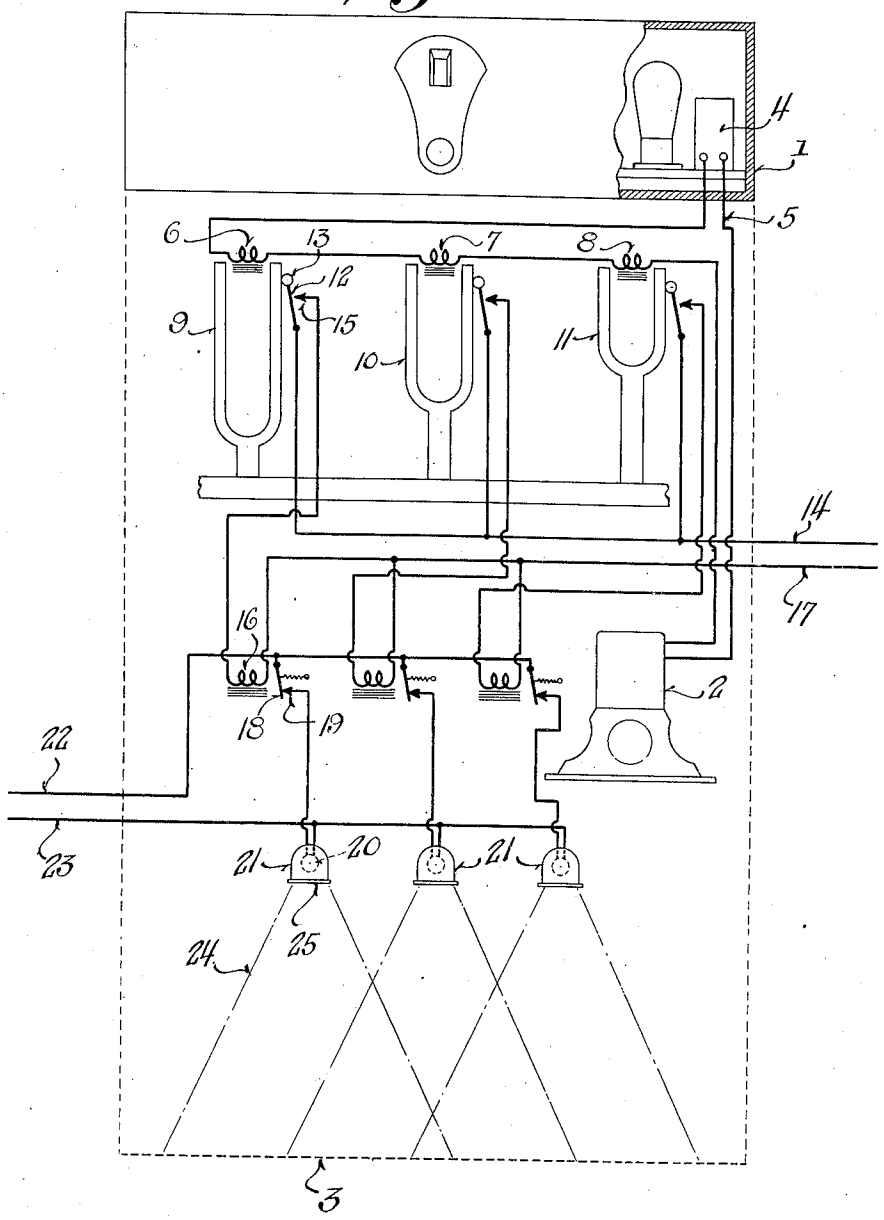
Feb. 6, 1934. W. T. LEWIS ET AL 1,946,026

COLOR PRODUCING DEVICE

Filed May 6, 1929 3 Sheets-Sheet 1

Fig. 1



Inventors:
William Turnor Lewis
George Thomas
By Arthur R. Woolfolk
Attorney

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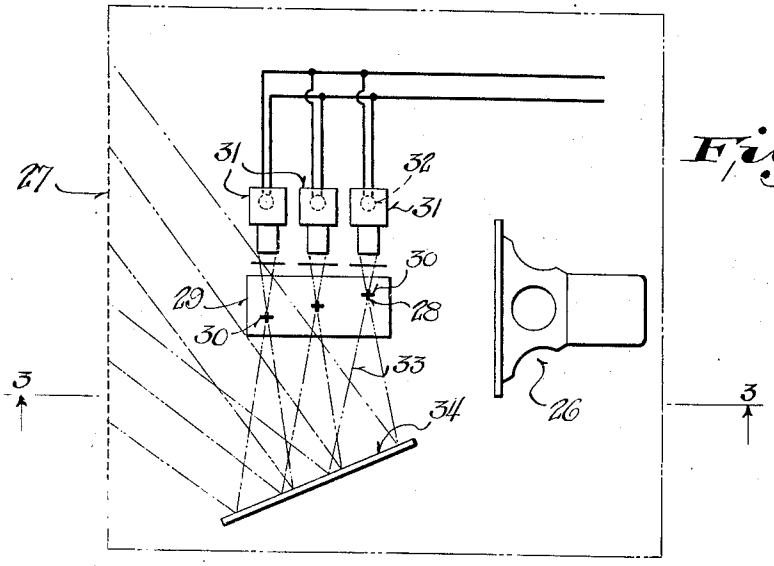


Fig. 2

Fig. 3

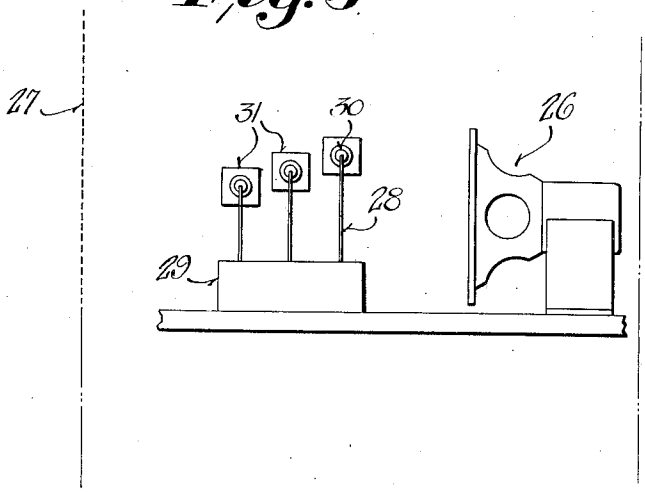
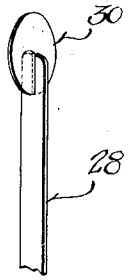


Fig. 4



Inventors
William Turnor Lewis
George Thomas

By Arthur R. Woolfork

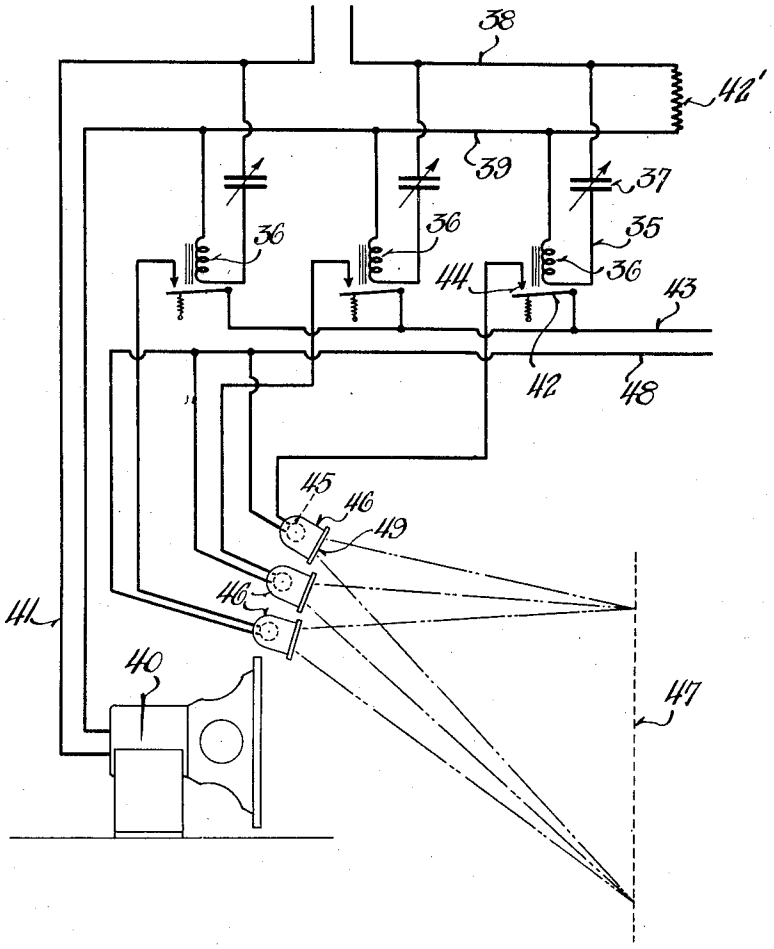
Attorney

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COLOR PRODUCING DEVICE

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Fig. 5



Inventor
William Turnor Lewis
George Thomas
By Arthur R. Woolfolk
Attorney

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COLOR PRODUCING DEVICE

William Turnor Lewis and George Thomas, Racine, Wis.; said Thomas assignor of three-eighths to said Lewis

Application May 6, 1929. Serial No. 360,884

5 Claims. (Cl. 84—464)

This invention relates to a color producing device and to a method of producing color effects, and is particularly directed to a device adapted to be associated with any sound producing device such, for instance, as a radio apparatus or phonograph.

It is a well-known fact, for example, in theater work, that when manually controlled color effects are provided, they materially enhance the enjoyment of the production. It is also a well recognized fact that different moods can be psychologically produced in an observer or listener by means of colors so that not only the other usual methods of producing these effects are at work, but also the effects themselves are enhanced by suitable, manually selected and controlled color effects.

In radio or phonograph reproduction it is the regular practice to provide a cabinet or console which is made as attractive as possible, so that it produces a harmonious effect in the room in which it is placed. However, the only living, or vitally active effect produced by these devices is that from the ever changing music; otherwise the apparatus is inert and lifeless, and it may be easily observed that the listeners are restlessly moving about the room or else looking at other objects than the apparatus itself.

This invention supplies a long felt want in providing a color effect for a sound producing apparatus, and the primary object of this invention is to provide an apparatus in which the color effect is automatically related to the music which is being reproduced by the apparatus.

In more detail, objects of this invention are to provide a radio or phonograph apparatus in which an ever changing color effect is automatically produced and is directly related to the theme, tempo, or character of the music and is controlled from the energy received by the apparatus, so that no thought or effort is required of the operator, but instead harmonious blending, shifting and changing of colors are automatically produced and are directly related to the music itself.

Further objects are to provide a sound reproducing apparatus in which a screen is employed and upon which colored lights are projected, the lights being automatically thrown on or cut off the screen and, in certain forms, shifted so that they occupy different positions upon the screen; and to provide means for blending these colors to produce any of a great variety of shades, the colors being continuously changing, coming and going, in step with and in complete accord with the music.

Further objects are to provide a sound producing apparatus in which the grill screen, through which the sound passes, may be employed as the screen upon which the colored lights are projected, so that the effect of being present at a theatrical performance is produced, and the observer or listener not only has the aural effect of the music, but also has the visual enjoyment in addition.

Further objects are to provide an apparatus which may be readily installed in or combined with a standard radio receiving apparatus, or phonograph, which is relatively simple in construction, which is thoroughly reliable, and which secures complete and absolute attunement or relative esthetic values between the music and the colors.

Further objects are to provide a sound reproducing apparatus equipped with means for projecting colored lights, in which automatic means are provided which control the colors so that certain colors or combinations thereof are related to certain predetermined notes occurring in the music, and in certain forms of which the intensity of a color is also in proportion to the intensity or predominance of the particular note to which the color is related.

Further objects of this invention are to provide a process of reproducing music and simultaneously producing a visual effect in accordance with the theme, tempo, or character of the music, or in accordance with the notes whether sounded separately or in a chord.

Further objects are to provide a process of reproducing music and automatically and simultaneously controlling, projecting, or forming varying color patterns or effects, the colors being related to the notes of the music and in certain phases having intensities varying in accordance with the loudness or intensity of the note.

Embodiments of the invention are shown in the accompanying drawings, in which:—

Figure 1 is a diagrammatic view showing one form that the invention may take, the control apparatus being a combination of electrical and mechanical means.

Figure 2 is a diagrammatic view of a further form of the invention in which the means employed are wholly mechanical.

Figure 3 is an elevation corresponding to a section on a line 3—3 of Figure 2.

Figure 4 is a detail of one of the vibrating reeds.

Figure 5 is a diagrammatic view of a further form of the invention in which the control mechanism is electrical.

For the sake of illustration the apparatus has been shown on the drawings as associated with a radio receiving apparatus, but it is to be understood that the invention is of broader scope and contemplates the association of the device with a phonograph, radio receiving apparatus or any other sound reproducing apparatus.

Referring to the drawings, particularly Figure

1, it will be seen that the color producing device is shown as associated with a radio receiving apparatus indicated generally by the reference character 1. This radio receiving apparatus may be of the usual type and may be mounted in any form of cabinet. It is usual to provide an apparatus of this type with a speaker unit such as the dynamic speaker 2 and with a grill screen, indicated diagrammatically at 3, through which the sound passes. In a receiving apparatus of this type it is customary to provide a filter 4 from which leads or conductors 5 extend and connect the radio receiving apparatus with the loud speaker 2. The circuit including the leads 5 also is provided with a plurality of small electromagnets 6, 7 and 8. These electromagnets are designed to actuate tuning forks 9, 10 and 11. These tuning forks have different pitches corresponding to different notes.

From the description thus far given it is obvious that when the electrical impulses in the circuit of the loud speaker are in step with the period of a particular tuning fork, that this tuning fork will be thrown into vibration. The other tuning forks, however, will not be disturbed, as the electromagnets are so designed and related to the tuning forks that they do not overpower and force the tuning forks into vibration, but only throw the forks into vibration when the audio frequency corresponds to the frequency of vibration of the tuning forks. It is apparent, therefore, that these tuning forks and the associating electromagnets constitute selector means which respond to certain notes whether the notes occur singly or in a chord. It is to be distinctly understood that, although only three tuning forks have been shown, any number of tuning forks could be employed. In addition to this, it is within the province of this invention to provide tuning forks corresponding to the primary colors.

Associated with each tuning fork is a lightly pivoted lever 12 provided with a rubber or felt head 13. This head or hammer lightly rests against the adjacent tuning fork. Obviously, when the fork is vibrating, the rapid slight blows of the fork against the head throw the head to the right, as viewed in Figure 1, and hold the head in this position due to the inertia of the lever 12 and head 13.

Each of the levers 12 is connected to one side 14 of an electrical circuit, for example, the 110 volt lighting system. A stationary contact 15 is provided adjacent to each lever 12 and is adapted to be engaged by such lever whenever the lever is thrown outwardly by means of the associated tuning fork. The stationary contact 15 in each case is connected to one of a series of electromagnets 16, the other side of each electromagnet being connected to the return conductor 17.

Each electromagnet 16 is provided with a small armature 18, which is spring held against a stationary contact 19, and thus normally maintains a local circuit closed. Each local circuit includes an electric lamp 20 mounted within a reflector 21. These electric lamps may be supplied through conductors 22 and 23 connected to the 110 volt lighting system similarly to the conductors 14 and 17. If desired, the conductors 14 and 17, as well as the conductors 22 and 23, may be connected to the A battery or to any other source of electrical energy.

Each of the reflectors 21 is adapted to project a cone of light indicated by the reference character 24 upon the grill screen 3. It is preferable to arrange these lights either in completely superimposed relation or else in overlapping relation, the latter arrangement being shown in Figure 1. In other words, the portions of the screen 3 illuminated by the lights or lamps may overlap as indicated in the drawings, or, if desired, all of the lights may illuminate the same portion of the screen.

Each reflector is adapted to project a different color of light upon the screen either by means of suitably coloring the corresponding lamps or else by means of colored plates 25 carried in front of the reflectors, as indicated in Figure 1.

It is apparent that normally all of the colored lights are on and a blending of colors is secured for a major portion of the screen. Also the colors occupy different positions upon the screen. Therefore, when one or more of the lights is extinguished, the colors on the screen change their characteristics both as regards hue or tint, due to mixing of the colors, and also in the form shown as regards its position upon the screen. In other words, there is a variation in the color or lighting of the screen both as regards the tint or shade and also as regards the portion of the screen illuminated.

This use of the screen in no way interferes with the free passage of the sound from the speaker therethrough.

It will be seen from the description and drawings illustrating this form of the invention that when a particular note is sounded by the apparatus that the device extinguishes one of the lights. Consequently the color pattern and the color itself projected upon the screen changes. If another note is sounded some other light is extinguished, whereas the first light may again come on when the first mentioned note has ceased to sound. In this way it is clear that each individual note in the music corresponds to a color adapted to be projected upon the screen. Thus there is a continuous variation of the colors in exact accord or in exact step with the music, the colors varying with the theme, character, or tempo of the music.

Also, no thought on the part of the operator is required, as the apparatus functions in a wholly automatic manner.

Another form of the invention is illustrated in Figure 2. In this form the control or selector means for the different colors is wholly mechanical. A loud speaker 26 is shown directed toward a screen 27, the screen in each case being preferably some form of fine mesh fabric. Immediately in front of the loud speaker 26 a plurality of reeds 28 are positioned. These reeds may be of different lengths, as shown in Figure 3, so that they will vibrate at different rates. They may be carried in any suitable manner, as by means of the relatively heavy base 29. Each reed is attuned to a different note, so that when that particular note is sounded, the corresponding reed vibrates. Each reed carries a small disc 30 at its upper end which normally stands directly in front of a light projecting apparatus 31, see Figure 2. Each projecting apparatus may include an electric lamp 32 and is preferably so arranged as to cause the light rays 33 to converge or cross approximately at the corresponding disc 30. Therefore, differing from the form of invention shown in Figure 1, all of the light is normally cut off by the discs 30. When a particular disc vibrates, it is apparent that it moves rapidly back and forth in front of the corresponding projector and thus is out of the line of the light for the major portion of the time. The vibration of a

particular reed is, of course, dependent upon the presence of a selected note in the sound produced by the loud speaker.

It is preferable, in this form of the invention, to provide a reflecting mirror 34 which throws the light rays or cones of light back upon the screen 27.

Referring to the form of invention shown in Figure 5, it will be seen that electrical filter circuits or selecting circuits 35 have been provided, and that each of these circuits includes as its inductance an electromagnet 36. A condenser 37 is connected in series with the electromagnet and the circuit therefore constitutes a resonant circuit. The condensers 37 may be either fixed or variable, and if variable, they are initially tuned to produce the desired characteristic of the selector or resonant circuit. The resonant circuits are connected in parallel across the conductors 38 and 39. The conductor 38 is connected to the radio receiving set as previously described in reference to Figure 1, and the conductor 39 is connected to the loud speaker 40. A conductor 41 leads from the loud speaker back to the radio receiving apparatus. It is to be noted also that a resistance 42' of the proper value is bridged across the conductors 38 and 39 and serves to pass any current which is not passed through one or more of the resonant circuits.

Each electromagnet is provided with a small springheld armature 42 which is connected to a supply lead 43. Each armature is adapted to contact with a stationary contact 44 when the electromagnet is energized. The stationary contacts 44 are connected to electric lamps 45 carried within reflectors 46. These reflectors are all trained upon or directed towards the grill screen 47. It is to be noted that the return conductor from each electric light or lamp 45 is connected to the return lead 48. The leads 43 and 48 may be supplied from any suitable source of electrical energy, the A battery, for instance, or the 110 volt lighting circuit.

It is apparent that when electrical impulses of the appropriate frequency are impressed upon the speaker circuit that one or more of the resonant circuits is active and allows its electromagnet to become energized, thus closing the circuit of the corresponding electric lamp. Each reflector is provided with a colored plate 49 through which the light passes. Thus it is clear that when a certain note is sounded, a certain color is projected upon the screen. If two notes are sounded corresponding in frequency to that of two of the circuits, two of the colored lights are projected upon the screen.

In each form of the invention the blending of colors is effected, although obviously the colors could occupy separate portions upon the screen. However, a more beautiful effect is produced when the colors either partially overlap, as shown in Figures 1 and 2, or else wholly overlap, as shown in Figure 5, so that blending is obtained in addition to the varying of the colors themselves. Obviously, by suitably selecting the number of colors and the variety of colors any of a multitude of different hues may be produced.

It is to be understood that any of the several features shown in the different forms of the invention may be combined with any other of the features, as it is intended that the drawings be interpreted as illustrating a few of the many possible forms that the invention may take.

It is to be noted that, in the form shown in Figure 2, the intensity of the color is also proportional to the intensity of the sound, for obviously the reeds will vibrate to a greater extent for a more powerful sound than for a less powerful sound, and accordingly the intensity of the light or the amount of light allowed to pass will be controlled.

It is to be distinctly understood that although a radio receiving apparatus has been disclosed, that the invention is not limited to this form of sound reproducing apparatus. It obviously may be employed in a phonograph or any other apparatus in which energy in a form other than sound is transformed into energy in the form of sound.

In the forms shown in Figures 1 and 5, the electrical circuits could be associated with the electrical circuit of an electric phonograph such as the electromagnetic pick up type. In the form shown in Figure 3, the vibrating reeds could be placed directly in the sound chamber, if desired.

It will be seen that a novel device has been provided which produces varying colors which blend, shift, appear or disappear in exact accordance with the music.

The expression "sound reproducing" apparatus, "music reproducing" apparatus, or similar expressions appearing in the claims, is intended to cover a radio apparatus, a phonograph, or any other means for transforming energy in a form other than sound, into energy in the form of sound.

Although the invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

We claim:

1. A device adapted to be controlled from a music reproducing apparatus, said device comprising means for producing colored lights, and means adapted to mechanically vibrate at an audible frequency for automatically blending said lights in accordance with the said music.

2. In a wireless receiving apparatus having sound producing means, a plurality of sources of differently colored lights, and means actuated directly by the sound from said sound producing means for blending the colored light from said plurality of sources.

3. In a device of the class described the combination of a plurality of constantly illuminated colored lights; a plurality of shutters individually controlling said colored lights; and mechanically resonant means for operating said shutters, said mechanically resonant means being individually responsive to sounds of different frequencies.

4. In a device of the class described the combination of a plurality of colored lights; a plurality of members mechanically resonant to sounds of different frequencies; a shutter carried by each of said last mentioned means and interposed in the path of one of said colored lights.

5. In a device of the class described the combination of a plurality of colored lights; a shutter for each of said colored lights; and a separate resonant member for each shutter, said resonant members being resonant to sounds of different pitches.

WILLIAM TURNOR LEWIS.
GEORGE THOMAS.