June 25, 1929. M. C. THOMAS 1,718,499

COLOR DESIGN DISPLAY CONTRIVANCE

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Fig. 1.

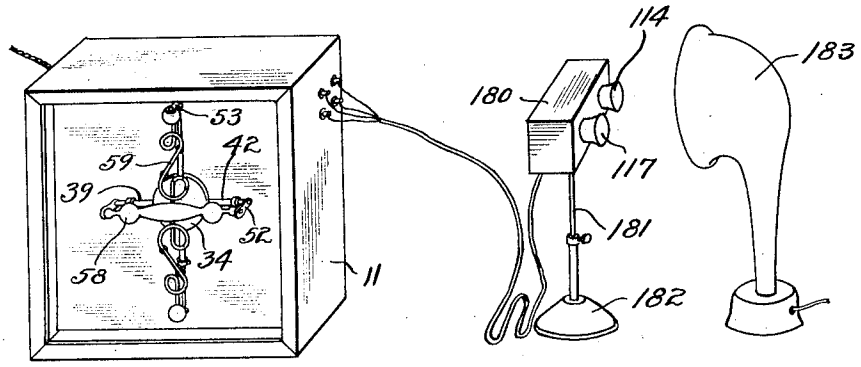


Fig. 5.

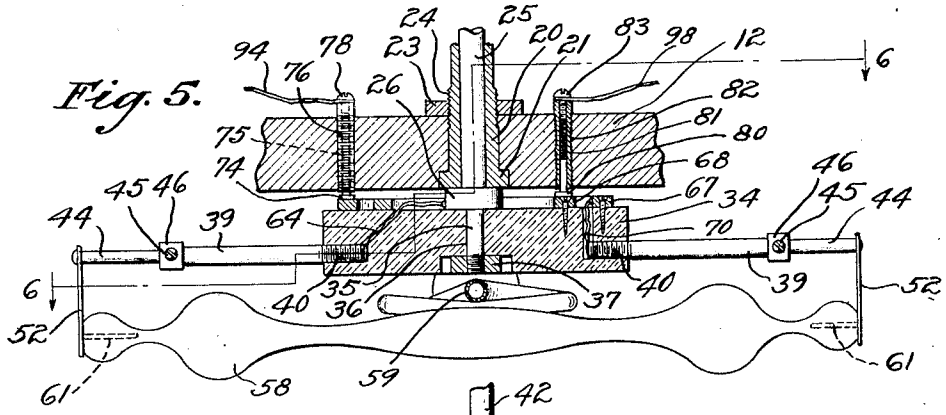
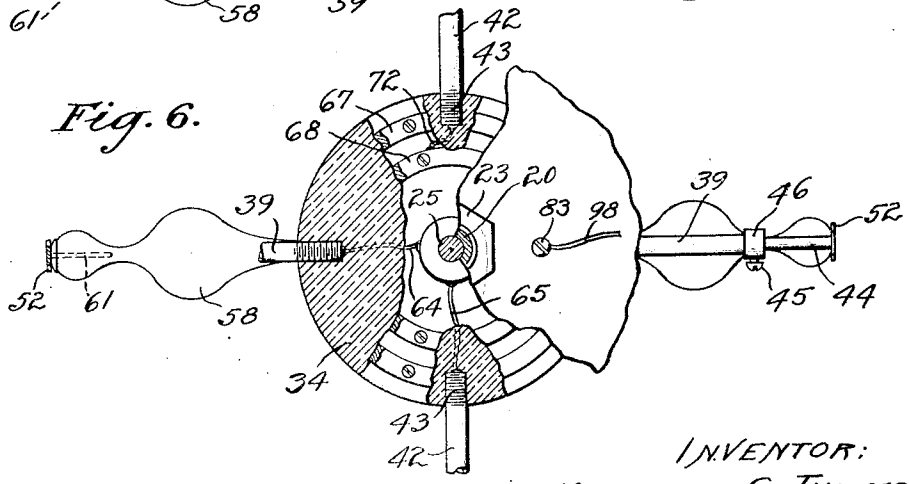


Fig. 6.



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Fig. 2.

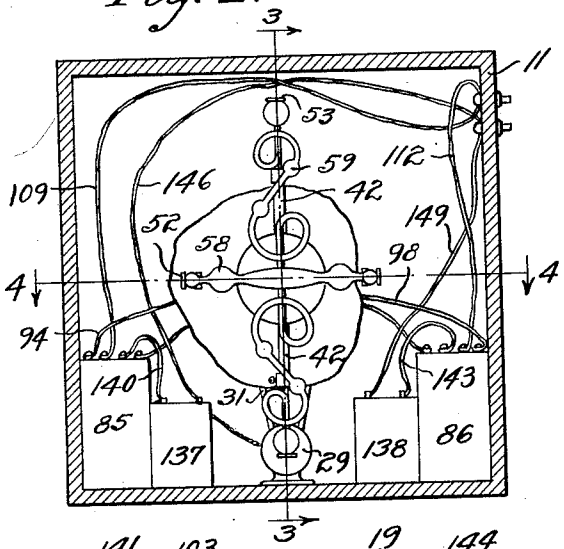


Fig. 3.

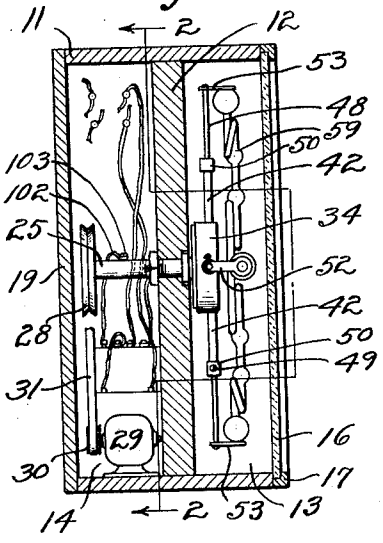


Fig. 4.

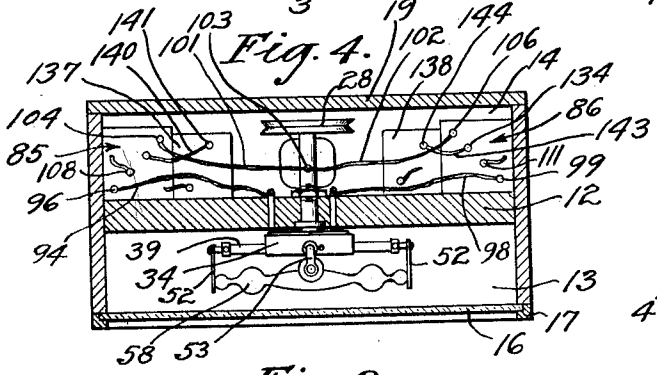


Fig. 7.

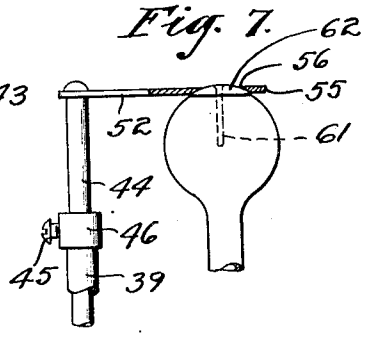


Fig. 9.

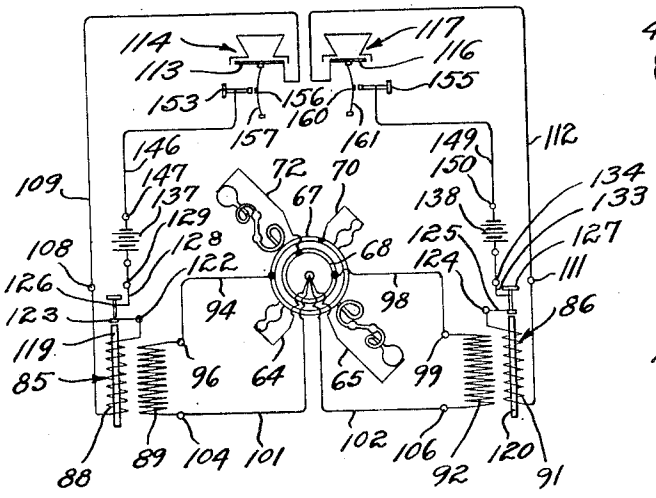
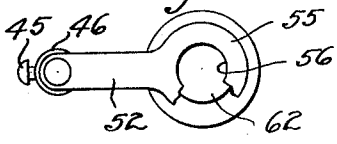


Fig. 8.



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Patented June 25, 1929. 1,718,499

UNITED STATES PATENT OFFICE.

MARGUERITE C. THOMAS, OF LOS ANGELES, CALIFORNIA.

COLOR-DESIGN-DISPLAY CONTRIVANCE.

Application filed September 22, 1925. Serial No. 57,980.

My invention relates to a contrivance which is useful for purposes of entertainment, education, display advertising, and the like.

It is an object of this invention to provide a contrivance which will produce different designs of changing colors in response to sound vibrations.

When a vacuum tube or Crookes tube has the electrodes thereof connected in an electric circuit, electric discharges will pass between the electrodes, producing different shades of color throughout the length of the tube. These colors vary as the length of the tube and the diameter of the tube varies.

It is also an object of this invention to provide a contrivance for the purpose mentioned having a rotor carrying one or more vacuum tubes, the terminal of which tubes is connected in circuits having sound responsive means for establishing these circuits.

It is another object of this invention to provide a contrivance of this character in which the rotor is driven by a motor.

It is another object of this invention to provide a contrivance of this character which has arms secured to adjustable slide bars so that different lengths of tubes may be carried by said rotor.

It is a further object of this invention to provide a contrivance of this character in which the circuit of one of said tubes has a sound responsive means which is affected by the higher tones, and in which the circuit of the other of said tubes has a sound responsive means which is affected by the lower tones.

It is also an object of this invention to provide a contrivance of the character mentioned in which the electric circuits have induction coils for obtaining intensity currents.

Sometimes very long notes are produced which would actuate the sound responsive means in such a manner as to prolong the closing of the circuits and to cause continued streams of colored light through the tubes. The designs are much more attractive if the colored streams are broken, and it is therefore sometimes desirable to include interrupters in the circuits for breaking prolonged closing of the circuits which would ordinarily be produced by long notes.

It is accordingly another object of this invention to provide a contrivance of the character mentioned in which the electric circuits are provided with circuit interrupters.

Other objects and advantages of this invention will be made evident hereinafter.

Referring to the two drawings in which I illustrate a preferred form of my invention:

Fig. 1 is a view illustrating one of the uses of my invention.

Fig. 2 is a section taken through my invention substantially as indicated by the line 2—2 of Fig. 3.

Fig. 3 is a section taken substantially as indicated by the line 3—3 of Fig. 2.

Fig. 4 is a section taken on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged fragmentary section taken through the rotor of my invention.

Fig. 6 is a section taken on the line 6—6 of Fig. 5.

Figs. 7 and 8 are enlarged fragmentary views showing the manner in which the vacuum tubes employed in my invention are secured to the rotor.

Fig. 9 is an electrical diagram showing the various circuits of the apparatus.

As shown clearly in Figs. 2 to 6 my invention provides a case 11 having a central wall 12 which divides the case 11 into a front compartment 13 and a rear compartment 14. The front compartment 13 has a transparent front wall 16 which may be made of glass and which may be secured in place as by cleats 17. The rear compartment 14 is closed by a rear wall 19.

Extending through the wall 12, as shown in Figs. 5 and 6, is a bearing sleeve 20 having a head 21 which rests in a recess provided in the front face of the wall 12. A nut 23 is advanced on a threaded portion 24 of the bearing sleeve 20, against a back face of the wall 12, for rigidly securing the bearing sleeve 20 in place. Extending through the bearing sleeve 20 is a rotor shaft 25 having an enlarged portion 26 which rests adjacent to the forward end of the bearing sleeve 20. A pulley 28 is secured on the rear extending end of the rotor shaft 25, which pulley cooperates with the enlarged portion 26 to prevent axial movement in the rotor shaft 25. A motor 29 is secured to the bottom of the case 11, this motor having a pulley 30 which drives the pulley 28 by means of a belt 31.

A cylindrical rotor 34 which is made from insulation material is secured on a forward part 35 of the rotor shaft 25. This forward

part 35 extends through an opening 36 of the rotor 34 and is threaded to receive a nut 37 for clamping the rotor 34 rigidly against a forward face of the enlarged portion 26 of the rotor shaft 25.

Primary tubes 39 are threadably secured at 40 to the rotor 34. These primary tubes 39 extend radially from the rotor 34 and in opposite directions. Secondary tubes 42 are secured to the rotor 34, as indicated at 43. These secondary tubes 42 extend radially from the rotor 34 and in opposite directions. The primary and secondary tubes 39 and 42 are preferably arranged to extend at right angles with respect to each other. The primary tubes 39 adjustably carry primary slide bars 44 which extend from the ends thereof and which may be fixed in a desired position by set screws 45 which are threaded into enlarged outer ends 46 of the primary tubes 39. Secondary slide bars 48 are adjustably carried by the secondary tubes 42 and may be fixed in any desired position by means of set screws 49 which extend through enlarged ends 50 of the secondary tubes 42.

Extending forwardly from the primary slide bars 44 are primary arms 52. Extending forwardly from the secondary slide bars 48 are secondary arms 53. The primary and secondary arms 52 and 53 are of the same shape except that the primary arms 52 are longer than the secondary arms 53. Both of the arms are constructed substantially as shown in Fig. 7. The forward ends of the arms are enlarged as indicated at 55, and have openings 56 formed therein.

A primary vacuum tube 58 is carried by the primary arms 52, and a secondary vacuum tube 59 is carried by the secondary and shorter arms 53. As clearly shown in Fig. 7, the vacuum tubes 58 and 59 have electrodes 61 extending into opposite ends thereof. The electrodes are connected with caps 62 which are placed at the ends and on the outside of the vacuum tubes 58 and 59.

As shown in Figs. 7 and 8, the enlarged portion 55 of the primary and secondary arms engage the caps 62. Portions of these caps 62 extend into the openings 56, centralizing the tubes 58 and 59 and preventing them from being displaced. One of the primary tubes 39 is electrically connected to the enlarged portion 26 of the rotor shaft 25 by means of a wire 64, and one of the secondary tubes 42 is electrically connected to the portion 26 of the rotor shaft 25 by a wire 65. The wires 64 and 65, as shown in Figs. 5 and 6, extend partially through the rotor 34 and connect to the primary and secondary tubes 39 and 42 at their inner ends. Secured to the rear face of the rotor 34 is a primary or outer commutator ring 67 and an inner or secondary commutator ring 68. The other of the primary tubes 39 is connected to the outer or primary commutator ring 67 by a wire 70 and the other of the secondary tubes 42 is connected to the inner or secondary commutator 68 by a wire 72.

A primary brush 74 is held in engagement with the primary commutator ring 67 by means of a spring 75 which is retained in a sleeve 76. This sleeve 76 is supported by and extended through the central wall 12. The spring 75 is held in the sleeve 76 by means of a screw 78. A secondary brush 80 is held in engagement with the secondary commutator ring 68 by means of a spring 81 which is retained in a sleeve 82 which is supported by and extends through the central wall 12. The spring 81 is held in position in the sleeve 82 by means of a screw 83.

In the rear compartment 14 is placed a primary induction coil 85 and a secondary induction coil 86. The primary induction coil 85 has a primary winding 88 and a secondary winding 89, and the secondary induction coil 86 has a primary winding 91 and a secondary winding 92. A wire 94 is secured to the primary sleeve 76 by the screw 78, thus making the wire in electrical connection with the primary brush 74. The wire 94 is also connected to a terminal 96 of the primary induction coil 85. A wire 98 is connected to the secondary sleeve 82 by the screw 83, thus being in electrical connection with the secondary brush 80, and is connected to a terminal 99 of the induction coil 86. The terminals 96 and 99 are connected to the secondary windings 89 and 92 of the induction coils 85 and 86. Wires 101 and 102 are connected to the rear part of the bearing sleeve 20 by means of a screw 103. The wires 101 and 102 are therefore in electrical contact with the rotor shaft 25 which revolves in the bearing sleeve 20. The wire 101 is connected to a terminal 104 of the secondary winding 89 of the primary induction coil 85, and the wire 102 is connected to a terminal 106 of the secondary winding 92 of the secondary induction coil 89.

Connected to a terminal 108 of the primary winding 88 of the induction coil 85 is a wire 109 and connected to a terminal 111 of the primary winding 91 of the secondary coil 86 is a wire 112. The wire 109 is connected to a diaphragm 113 of a primary sound responsive means 114 which, in the embodiment shown in the drawings, is a transmitter. The wire 112 is connected to a diaphragm 116 of a secondary sound responsive means 117, which is also a transmitter.

The primary winding 88 of the induction coil 85 is provided with a primary core 119 and the primary winding 91 of the coil 86 is provided with a secondary core 120. A terminal 122 of the winding 88 is connected to a primary armature 123 and a terminal 124 of the winding 91 is connected to a secondary armature 125. Placed adjacent to the primary armature 123 is a primary adjustable

contact 126, and adjacent to the secondary armature 125 is a secondary adjustable contact 127. The contact 126 is connected by a wire 128 to a terminal 129 and the contact 127 is connected by a wire 133 to a terminal 134.

A primary battery 137 and a secondary battery 138 are placed in the rear compartment 14 adjacent to the primary and secondary induction coils 85 and 86. A wire 140 is connected to a terminal 141 of the primary battery 137 and a wire 143 is connected to the terminal 134 and to a terminal 144 of the secondary battery 138.

A wire 146 is connected to a terminal 147 of the primary battery 137, and a wire 149 is connected to a terminal 150 of the secondary battery 138. The wire 146 is connected to an adjustable contact 153 of the primary sound responsive means 114, and the wire 149 is connected to an adjustable contact 155 of the secondary sound responsive means 117. The adjustable contact 153 is adapted to be contacted by a contact 156 carried by a spring arm 157 of the primary sound responsive means 114, this spring arm 157, being associated with the diaphragm 113 in such a manner as to be flexed thereby when a certain range of sound vibrations come in contact with this diaphragm. The adjustable contact 155 is placed adjacent to and adapted to be engaged by a contact 160 which is carried by a spring arm 161, this spring arm 161 being associated with the diaphragm 116 of the secondary sound responsive means 117, and being flexed by the diaphragm 116 when a certain range of sound vibrations comes in contact therewith.

The operation of my invention is substantially as follows:

The circuits of the primary winding 88 of the primary induction coil 85 and the circuit of the primary winding 91 of the secondary induction coil 86 are not established until the contacts 156 and 160 engage the contacts 153 and 155 of the primary and secondary sound responsive means 114 and 117. This occurs only when sound vibrations of a certain range strike against the diaphragms 113 and 116, and flex the arms 157 or 161 sufficiently to cause engagement of the mentioned contacts. The operation of either of these circuits is the same and for the purpose of description, let us consider the operation of the primary circuit.

When the spring arm 157 is flexed to a certain extent the contact 156 is moved into engagement with the adjustable contact 153. This will establish the circuit of the primary winding 88 and electricity will flow therethrough. This sets up a magnetic flux which cuts the secondary winding 89 and causes a current to flow therein. This current flows through the various circuit wires, the primary portion of the contrivance and the commutator ring 67 to the primary arms 52. The current in the secondary winding is of very high intensity which is desirable. The high intensity current flows through one of the arms 52 to one of the caps 56 by means of which it is conveyed to one of the electrodes 61. The current then flows in the form of ions through the primary vacuum tube to the other of the electrodes 61 through the other cap 56 and flows from the tube 58 through the other of the primary arms 52.

When the circuit of the primary winding 88 is established the core 119 is magnetized and the primary armature 123 is drawn thereagainst, out of engagement with the contact 126. This breaks the circuit of the winding 88. The armature 123 is held out of engagement with the contact 126 for a very small period of time which is sufficient for the core 119 to de-magnetize. When this occurs, the armature 123 will move back into engagement with the contact 126 and thus re-establishes the circuit of the primary winding 88. The operation of the secondary winding of my invention is the same as the primary winding.

As shown in Fig. 1, the primary and secondary sound responsive means 114 and 117 may be arranged in a housing 180 which is secured at the upper end of a slide 181 which is adjustably secured to a standard 182. This provides a portable means for supporting the sound responsive means so that they may be placed in a satisfactory position. In Fig. 1, I diagrammatically illustrate a loud speaker 183 in front of which the sound responsive means are positioned.

The induced currents in the secondaries of the induction coils are of high intensity which is very desirable and flow through the primary and secondary vacuum tubes in the form of ions. When the ions are flowing the tubes are luminous in all colors of the spectrum. The colors at one end of the tubes are different from the colors at the other end of the tubes. The colors throughout the vacuum tubes may be of a great variety of shades, which shades are produced by changing the diameters and lengths of the vacuum tubes. Excellent results may be obtained by coloring portions of the vacuum tubes.

The rotor 34 is rotated by means of the motor 29 and as the vacuum tubes rotate therewith the colors are flashed at different times during the revolutions, depending upon the sound vibrations. As previously mentioned, the primary sound responsive means is adapted to respond to such instruments as the drum, bass viol and the lower notes of other instruments; and the secondary sound responsive means is adapted to respond to the higher note instruments. The vacuum tubes, for this reason, will flash colors individually and generally at different times. It is quite impossible to describe the characteristics of the designs produced by my invention, since they

are of very peculiar shapes and are constantly changing. A single shape exists only for an instant. It may be said, however, that the designs produced by my invention are very beautiful in color, brilliancy and shape. The designs enhance in color and brilliancy with the accents of the music. When music having a drum is operating the contrivance, the beats of the drum prominently affect the designs of the contrivance; likewise other instruments or the voice will affect the operation of my invention.

My invention may be used for a number of purposes. It is useful as a contrivance of entertainment, since the different designs and color effects are very interesting to watch. Since the contrivance is attractive it is very valuable for display for advertising purposes. It is also very useful for educational purposes and may be used to train the eye and the ear. Instructors sometimes train children rhythm of music by tapping the beats of a certain piece of music and then having the children guess the piece. My invention would be very useful for this purpose. The vacuum tubes will very clearly display the accent and beat of music more nearly perfect than it is possible to do by tapping.

In lieu of the sound responsive means shown I may provide a device which, when the contrivance is used with a phonograph or such, may be attached directly to the sound arm thereof.

I claim as my invention:

1. In a contrivance of the character mentioned, the combination of: a rotor; means for rotating said rotor; tubes extending from said rotor; slide bars slidable in said tubes; arms secured to said slide bars; a color design producing means carried by said arms; and sound responsive means for operating said color design producing means.

2. In a contrivance of the character mentioned, the combination of: a rotor; means for rotating said rotor; tubes extending from said rotor; slide bars slidable in said tubes; arms secured to said slide bars; a color design producing means in the form of a vacuum tube carried by said arms; and sound responsive means for operating said color design producing means.

3. In an apparatus of the character described, the combination of: a color design producing means having a vacuum tube adapted to produce a colored light when excited by a relatively small electric current of high potential; an electric circuit in which the electrodes of said vacuum tube are included; and sound responsive means adapted to receive a sound and, when said sound reaches a certain pitch, to close said circuit.

4. An apparatus in which the combination of claim 3 is duplicated, the two sound responsive means being responsive to sounds of different pitch, and the two vacuum tubes being juxtaposed so that the different quality of colored lights produced by said tubes forms a variable design.

5. In an apparatus of the character described, the combination of: a color design producing means having vacuum tubes adapted to produce colored lights when excited by relatively small electric currents of high potential; electric circuits in which the electrodes of said vacuum tubes are included; separate sound responsive means responsive to sounds of different pitch, the vacuum tubes being juxtaposed so that the different quality of colored lights produced by said tubes forms a variable design; and means for rotating said tubes to create a novel illusion from the varying colors produced by said tubes due to variations in the pitch of said sounds.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 17th day of September, 1925.

MARGUERITE C. THOMAS.