March 14, 1939. G. S. WHIDDEN 2,150,854

DISPLAY DEVICE

Filed Oct. 14, 1937 2 Sheets-Sheet 1

FIG. 1

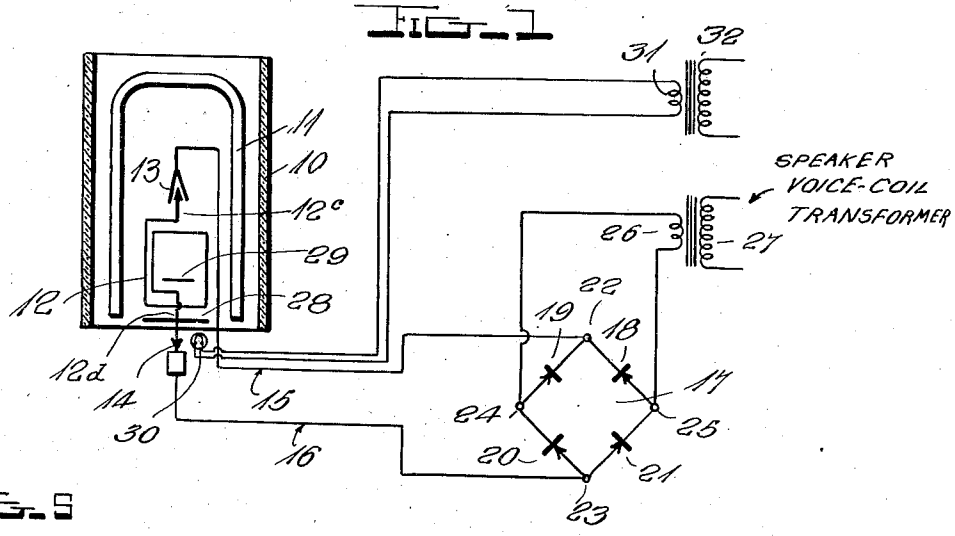


FIG. 5

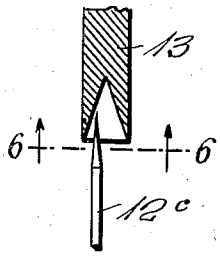
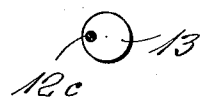


FIG. 6



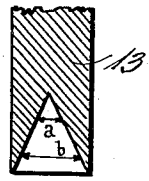


FIG. 7

FIG. 8

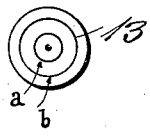


FIG. 12

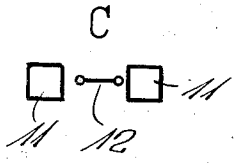


FIG. 13

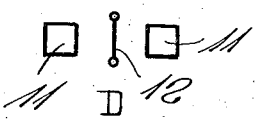


FIG. 9

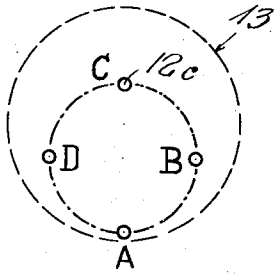


FIG. 11

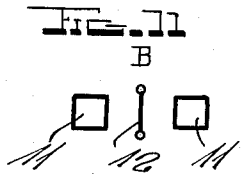
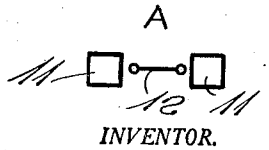


FIG. 10



INVENTOR.

Glen S. Whidden,

BY

Ben J. Chaney

ATTORNEY.

March 14, 1939. G. S. WHIDDEN 2,150,854

DISPLAY DEVICE

Filed Oct. 14, 1937 2 Sheets-Sheet 2

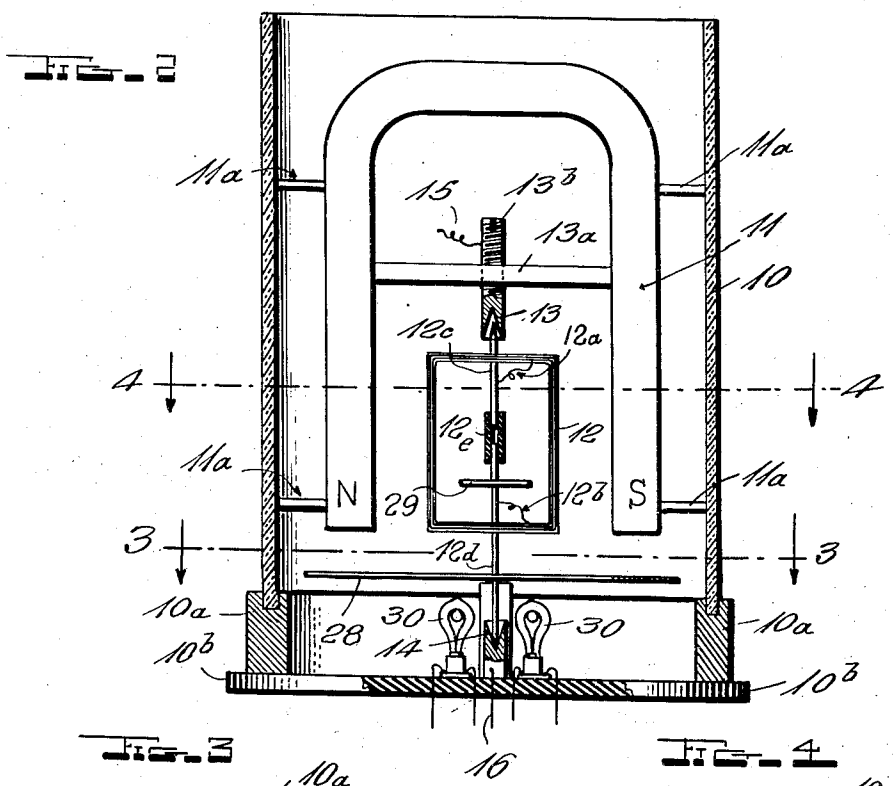


Fig. 3

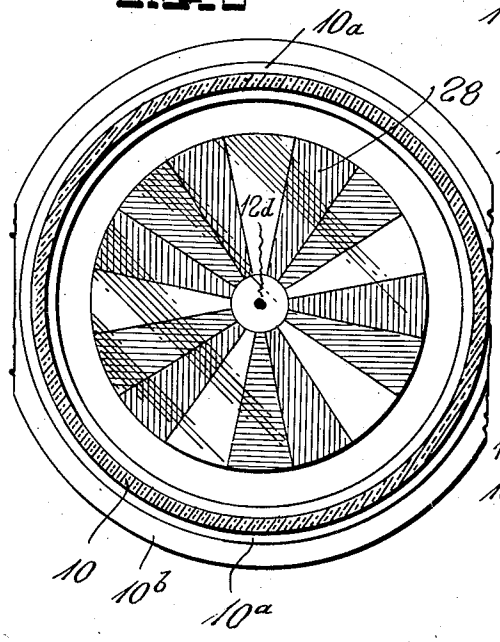
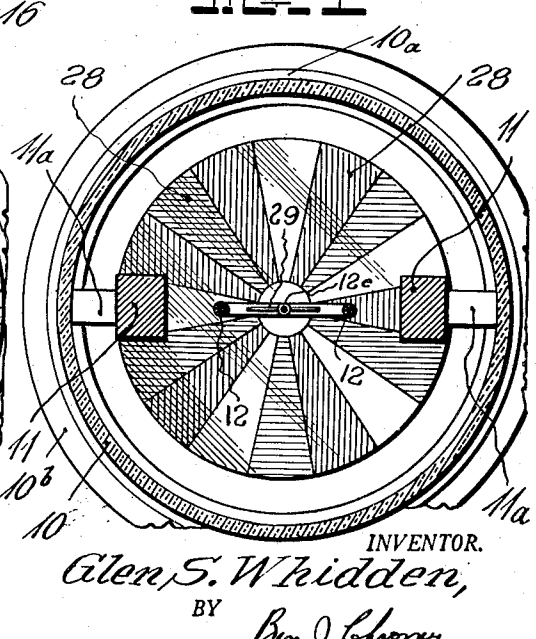


Fig. 4



INVENTOR.
Glen S. Whidden,
BY
Ben J. Chaney
ATTORNEY.

Patented Mar. 14, 1939

2,150,854

UNITED STATES PATENT OFFICE

2,150,854

DISPLAY DEVICE

Glen S. Whidden, Lansing, Mich.

Application October 14, 1937, Serial No. 169,024

8 Claims. (Cl. 84—464)

This invention relates to novelty, amusement or advertising display devices generally. More particularly this invention relates to an electrically energized device adapted to be connected to a radio receiver to produce varying and pleasing effects depending upon the type of program being received over said radio receiver.

The principal object of this invention is to provide a novelty, amusement or advertising display device which may be connected to a radio receiver. The device consists primarily of a semi-transparent or translucent screen which may be made of clear or colored glass formed into a dome-like or cylindrical shape inside of which are positioned a rotatable colored light filter, one or more lamps for projecting light through said filter upon the screen and an electromagnetic device adapted to be connected to the radio receiver for rotating said filter. The electro-magnetic device is provided with a winding which is connected through a suitable circuit arrangement to be energized in accordance with signaling energy received by a radio receiver to produce certain attractive effects when the filter is rotated to vary the colors of the light projected to the screen.

The various features and details of construction of my invention will be more fully set forth in the following specification and drawings in which briefly, Fig. 1 is a schematic diagram of connections; Fig. 2 is a sectional view of the display device in vertical elevation; Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2; Fig. 4 is a sectional view taken along the line 4—4 of Fig. 2; Figs. 5, 6, 7 and 8 are detail views of bearings and electrical winding contacts; and Figs. 9, 10, 11, 12 and 13 are explanatory diagrams to illustrate the operation of certain features of my invention.

Referring to the drawings in detail reference numeral 10 designates a translucent or transparent cylindrical screen which may be made out of material such as glass, Celluloid, Bakelite or the like. This screen may be made out of clear or colored glass and the surface ground or sand blasted. If desired suitable designs may be painted, or printed or otherwise formed or fixed in or on surfaces of this screen. A permanent magnet 11 of the horse shoe type is supported inside of the screen by suitable arms 11*a* which are attached to the magnet and to the screen. A small coil 12 comprising a plurality of turns of relatively fine wire, the ends 12*a* and 12*b* of which are connected to the upper and lower electrically conductive shafts 12*c* and 12*d* respectively, is supported in the magnetic field, that is, between the north and south poles of the magnet 11. Suitable cement may be used for attaching this coil to the shafts. The shafts 12*c* and 12*d* are insulated from each other by the small coupling 12*e* which holds the shafts in spaced relation so that these shafts may be used as terminals for the aforesaid coil 12. The upper portion of the shaft 12*c* extends and fits loosely into the bearing 13 which will be described more fully in further paragraphs of this specification. The lower shaft 12*d* rests in the bearing 14 which is attached to the baseboard 10*b*. The lower edge of the screen 10 is fitted into a groove formed in the top edge of the supporting member 10*a* which is also attached to the panel 10*b*. The upper bearing member 13 is supported by the cross piece 13*a* which is positioned between the arms of the horse shoe magnet. The section 13*b* of this bearing is threaded and is received in a threaded hole formed in the cross piece 13*a*, to facilitate adjustment of the bearing with respect to the shaft 12*c* and to permit removal of the coil 12 from the associated apparatus.

Conducting wires 15 and 16 are connected to the electrically conductive bearings 13 and 14 respectively, for the purpose of connecting the ends 12*a* and 12*b* of the coil 12 to the points 22 and 23, respectively of the rectifier bridge circuit 17 which includes the rectifier devices 18, 19, 20 and 21. The points 24 and 25 of the rectifier bridge circuit 17 are connected to the terminals of the voice coil secondary 26 of the radio receiver output transformer 27. The voice coil of the loudspeaker of the radio receiver is also connected to the secondary 26 of this transformer.

Normally the voice modulated electric current flowing through the secondary coil 26 is an alternating current. In the present invention part of the alternating current supplied by this secondary is impressed across the bridge circuit 17 and rectified by the rectifying devices 18, 19, 20 and 21 so that the current fed to the coil 12 through the conductors 15 and 16 is a pulsating direct current.

The lower shaft 12*d* associated with the coil 12 carries a colored translucent or semi-transparent disc 28. This disc is divided into a plurality of sections or areas which are colored with various hues or colored shades as shown in Figs. 3 and 4. Below the disc 28 are positioned the lamps 30 which are connected to a secondary winding 31 of the transformer 32. This transformer 32 may be one of the power supply transformers in the radio receiver set, for example the transformer supplying the cathode heater circuits. If desired

however, the lamps **30** may be small lamps adapted to be connected directly to the 110 volt lighting circuit.

When the lamps **30** are energized the light produced thereby is transmitted through the light filter **28** to the screen **10** and this screen is illuminated and various colored light patterns are produced thereon. These light patterns and effects are varied as the filter disc **28** is rotated through the action of the magnet **11**, the coil **12** and/or the bar **29** which is cemented, soldered, spot welded or otherwise attached to the shaft **12***c* or **12***d*.

The rotation of the coil **12** is controlled by the electrical energy fed through it by the conductors **15** and **16**, however this coil unit is provided with a polarizing member **29** of iron or other magnet material which is attracted by the magnetic lines of force of the magnet **11** and returns the coil into a predetermined position with respect to the poles of the magnet inasmuch as this polarizing bar **29** always tends to assume a position with its longest dimension parallel to the lines of force of the permanent magnet.

The electrical energy fed to the coil **12** is in the nature of a pulsating direct current modulated in accordance with the voice, music, sound or other mechanical vibrations forming the signal received over the radio receiver. Inasmuch as this pulsating direct current is not of a steady nature the magnetic field produced by the flow of this current through the coil **12** will not be of continuous or steady nature. The reaction between the magnetic field of the permanent magnet and the magnetic field of the coil **12** will cause this coil to rotate and will also cause the circuit formed by the shaft **12***c* and the bearing **13** to be interrupted through vibration and rotation of the coil.

The bearing **13** is more clearly illustrated in Figs. 5, 6, 7 and 8. This bearing is purposely made to fit over the top of the shaft **12***c* rather loosely so that vibration or movement of the shaft will interrupt the electrical circuit between it and the shaft. When the shaft **12***c* is moved towards the center of the bearing **13** the contact is completely broken as is more clearly illustrated in Fig. 9 wherein the bearing is shown enlarged and the shaft **12***c* is shown in four different positions A, B, C and D. The path or locus of the shaft **12**c is illustrated by the broken line. It is of course obvious that various paths may be taken by the shaft in the course of its movement with respect to the bearing and that herein set forth is by way of example only. The form of the path taken will of course be determined to a large extent by the frequency and amplitude of the pulsations of the pulsating current energizing the coil **12**. By adjusting the position of the bearing **13** with respect to the end of the shaft **12***c* so that this end reaches either position *a* or position *b*, Fig. 7, the movement of the coil **12** also may be varied until the desired results are obtained. During the rotation of the coil **12** between the poles of the magnet **11** as illustrated in Figs. 10 to 13 inclusive, the coil is subjected to the action of the magnetic field of the permanent magnet at all times even when this coil itself is not energized inasmuch as the polarizing bar **29** attached to the coil shaft is under the influence of the permanent magnet field. This polarizing bar is arranged so that it causes the coil **12** to be returned into the plane of the magnet poles when the coil is de-energized. At the same time as this takes place the end of the shaft **12***c* of course contacts the bearing **13** so that the circuit between this shaft and the bearing is complete to pass electrical energy to the coil. When the coil circuit including the conductors **15** and **16** and the rectifier is again energized, for instance by connecting the radio receiver to receive signal energy, the coil is in condition to again receive the pulsating direct current.

The effects obtained from the display device of my invention will be varied depending upon the rhythm of the music received, for example, under certain conditions this device may produce a smoothly or uniformally varied lighting on the screen whereas under other conditions, that is, when music or sound impulses of different rhythm characteristics are received, the lighting effects produced may be non-uniformally changed because of the irregular rotation of the filter disc.

While I have described my invention in detail with respect to a certain preferred embodiment thereof it is of course obvious that modifications of my invention may be produced without departing from the spirit thereof and therefore I do not desire to limit the invention to the exact details shown and described except insofar as they are defined by the claims.

What I claim is as follows:

1. In display devices adapted to be connected to a radio receiver to be energized in accordance with signal energy the combination of a substantially translucent screen, an incandescent lamp for illuminating said screen from the inside, a rotatable colored filter positioned over said lamp to vary the color of the light transmitted to said screen when said filter is rotated, a shaft for said rotatable filter, a coil of wire mounted on said shaft, means for producing a magnetic field around said coil, and means for impressing signal energy from the radio receiver on said coil to produce a second magnetic field to react with the aforesaid magnetic field to rotate said filter and vary the color effects produced on said screen.

2. A display device comprising a light filter member, electromagnetic means for rotating said filter, said electromagnetic means including means for producing a magnetic field, a coil in said field, shafts electrically connected to said coil and bearings for said shafts, means for interrupting the electrical contact between one of said bearings and the shaft associated therewith during the rotation of said light filter, a source of light positioned adjacent to said filter, and a screen adapted to be illuminated by different colored light of varying intensities as said light filter is rotated.

3. A device as defined by claim 1 in which said shaft is in two sections electrically separated from each other, connections between said shaft sections and the terminals of said coil of wire, bearings for said shaft, connections between said bearings and a source of current for energizing said coil of wire, one of said bearings and shaft sections forming a relatively loose electrical contact adapted to interrupt the circuit to said coil of wire during movement of said coil of wire.

4. A display device comprising a light filter member, electromagnetic means for rotating said filter, said electromagnetic means including means for producing a magnetic field, a coil in said field, shafts electrically connected to said coil and bearings for said shafts, means for interrupting the electrical contact between one of

said bearings and the shaft associated therewith during the rotation of said light filter, a magnetic polarizing member connected to said coil to return said coil to a predetermined position, a source of light positioned adjacent to said filter, and a screen adapted to be illuminated by different lighting effects as said light filter is rotated.

5. A device as defined by claim 1 in which said shaft is in two sections electrically separated from each other, connections between said shaft sections and the terminals of said coil of wire, bearings for said shaft, connections between said bearings and a source of current for energizing said coil of wire, one of said bearings and shaft sections forming a relatively loose electrical contact adapted to interrupt the circuit to said coil of wire during movement of said coil of wire and a magnetic polarizing member connected to said coil to a predetermined position when said coil is not energized.

6. A display device comprising a light filter member, electromagnetic means for rotating said filter, said electromagnetic means including means for producing a magnetic field, a coil in said field, shafts electrically connected to said coil and bearings for said shafts, means for interrupting the electrical contact between one of said bearings and the shaft associated therewith during the rotation of said light filter, a source of light positioned adjacent to said filter, a screen adapted to be illuminated by different colored light as said light filter is rotated, and means for connecting said coil to the output circuit of a radio receiver, said last mentioned means including a rectifier and matching circuit for matching the electrical characteristics of said coil to said output circuit.

7. An electromagnetic device comprising a coil of wire, a shaft for said coil, said shaft being in two sections electrically separated from each other, connections between said shaft sections and the terminals of said coil of wire, bearings for said shaft, connections between said bearings and a source of current for energizing said coil of wire, one of said bearings and shaft sections forming a relatively loose electrical contact adapted to interrupt the circuit to said coil of wire during movement of said coil of wire, and means for connecting said coil to the output circuit of a radio receiver, said last mentioned means including a rectifier and matching circuit for matching the electrical characteristics of said coil to said output circuit.

8. A display device comprising a rotatable light filter, electromagnetic means for rotating said filter, connections for impressing modulated electrical energy from the output of signal amplifying means upon an energizing circuit of said electromagnetic means, means for interrupting the aforesaid energizing circuit during the energization thereof by said modulated electrical energy to produce discontinuous rotation of said light filter depending largely upon the character of the modulations of said electrical energy, a light source positioned adjacent to said filter, and a screen adapted to be illuminated by different colored light of varying intensities as said light filter is rotated.

GLEN S. WHIDDEN.