Sept. 29, 1931. W. H. WOODFORD 1,824,859

COLOR DISPLAY APPARATUS

Filed March 31, 1930

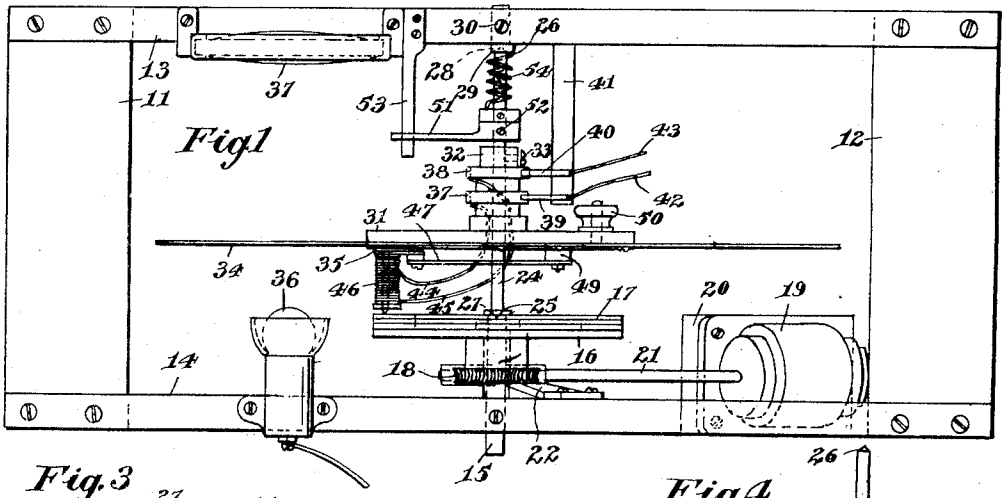


Fig.3

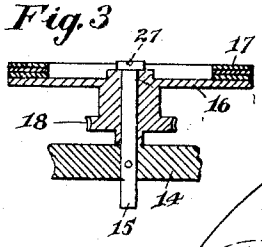


Fig.4

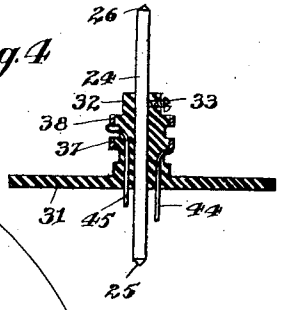


Fig.2

Fig.5

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COLOR DISPLAY APPARATUS

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The present invention relates to a color display apparatus, particularly for use in connection with a radio receiver or microphone, the object being to provide an apparatus by means of which color sensations will be produced in synchronism with sound sensations. The arrangement of colors will preferably be such that soft, harmonious, slowly changing colors and color blendings will be displayed with the softer modulated tones, while vivid colors and less harmonious blendings are displayed with the louder and more intense tones, the range between being accompanied by colors and blendings designed to be most in keeping with the character of the sound. It is proposed in the present embodiment to take a small percentage of the amplified impulse current from a radio receiving set, or microphone, utilizing the gradations of the current to actuate a suitable color screen.

Other objects are to provide a device which will be simple in construction and reliable in operation, and may be readily connected to a radio receiver, microphone, or other apparatus with which it is to be used.

With the above and other objects in view, an embodiment of the invention is shown in the accompanying drawings, and this embodiment will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:

Fig. 1 is a plan view of the color display apparatus, according to the present embodiment of the invention.

Fig. 2 is a rear elevation.

Fig. 3 is a detail sectional view of the mounting for the rotating drive member employed.

Fig. 4 is a detail sectional view of the mounting for the color screen employed.

Fig. 5 is a detail elevation of the mounting for the electro-magnet employed.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, the apparatus, according to the present embodiment of the invention, comprises a frame consisting of a base 10, vertical uprights 11 and 12 at each end and front and rear cross bars 13 and 14 extending between and supported upon the upper ends of the uprights.

A fixed stud shaft 15 is mounted centrally in the bar 14, and has a rotary drive member 16 mounted thereon, this member having a laminated soft steel ring 17 mounted on its face and provided on its hub with a worm gear 18. A small electric motor 19 is mounted upon an inclined support 20 secured to the base 10, its shaft 21 being journaled in a bearing 22 hung from the bar 14 and provided at its end with a worm 23 meshing with the worm gear 18. The rotary drive member is adapted to be constantly driven and, by means of a magnetic clutch means, hereinafter more fully described, to drive the color screen. The motor may be supplied with current from any suitable source and controlled by a rheostat to give the desired constant speed to the rotary drive member.

The color screen which is adapted to have movement imparted to it by the rotary disk member 16, hereinafter referred to as the power ring, is mounted upon a shaft 24, coaxial with the power ring and having cone bearings 25 and 26 at its ends engaged in sockets 27 and 28, provided respectively in the inner end of the stud shaft 15 and in a cylindrical bearing block 29, adjustably secured in an opening in the bar 13 by means of a set screw 30.

A screen carrying disk 31, of insulating material as hard rubber, has its hub 32 secured upon the shaft 24 by a set screw 33, the circular screen 34 being secured upon the face of the disk by means of a clamping ring 35. The screen is of transparent material and has a series of colored segments arranged in such relation that as it is rotated from a given position the desired colors will be successively brought into the focus line of a beam of light. This beam of light is supplied by an electric lamp 36 mounted on the bar 14 and after passing through the screen is diffused by a suitable

lens 37 upon a screen, wall or other suitable surface.

A pair of spaced current conducting slip rings 37 and 38, preferably of copper, are mounted on the hub 32, and are engaged by a pair of spring brush members 39 and 40, mounted on an arm 41 secured to the bar 13, and connected by lead wires 42 and 43 to the amplified impulse current of the radio loud speaker, microphone, or other suitable source of current. The rings 37 and 38 are connected by lead wires 44 and 45 extended through passages in the hub 32 to a high resistance electro-magnet 46, resiliently mounted upon a pair of spring arms 47 and 48 mounted upon a block 49 secured to the face of the disk 31. The end of the magnet is at a minimum distance from the armature or power ring, so that the magnetizing power is directly proportional to the magnetizing current.

A counter weight 50 secured upon the disk 31 in diametrically opposed relation to the magnet balances the weight of the magnet. The laminated structure of the power ring reduces the effect of reluctance residual magnetism and eddy currents.

The screen is normally maintained in a given or zero position by means of an arm 51, adjustably secured upon the shaft 24 by means of a set screw 52, and pressed against a stop arm 53 secured to the bar 13 by means of a coil spring 54 wound about the shaft, and having its ends connected to the hub of the arm 51 and to the adjustable bearing block 29. By rotary adjustment of the block 29 the tension of the spring may be increased or decreased as desired. The adjustment of the arm 51 permits any desired portion of the screen to be placed in the focus line of the lamp in the normal or zero position.

The operation is as follows:

The power ring is set in motion, and as the pulsating current from the radio receiver or microphone energizes the high resistance electromagnet it grips the power ring and is drawn with it against the force of the coil spring 54 to a point where the magnetizing force equalizes the spring resistance. As the current decreases or increases in intensity the color screen either moves back toward the zero position under the action of the spring or advances toward the limit of rotation, which is determined by engagement of the arm 51 with the under side of the stop arm 53. In this manner the complete range of colors and color blendings are displayed in synchronism with the sound range. The tension of the spring is adjustable to give various tensions, and as the tension increases proportionately as the screen moves from zero position greater current intensity or magnetic energy is required for the same time period of movement as the distance increases from the zero position.

It will be understood that any suitable arrangement of colors may be employed. For example, the screen may comprise three sections, the first section having soft and harmonious color blendings to correspond to the soft tones of instruments or voice, the second section having more pronounced colors and blendings, and the third section having vivid colors and less harmonious blendings in keeping with the louder and more intense sound impulses.

I have illustrated and described a preferred and satisfactory embodiment of the invention, but it will be obvious that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. In a device of the character described, a rotatable color display disk, variable drive means for rotating said disk to a greater or less extent and means for returning the disk to normal position when released from the drive.

2. In a device of the character described, a movable color display element, variable drive means for moving said display element to a greater or less extent, and means exerting a force on said display element in opposed direction to said driving element and adapted to be overcome in varying degrees by said variable drive means.

3. In a device of the character described, a movable color display element, an electromagnet adapted to have a current of varying intensity passed therethrough, and means associated with said magnet adapted to move said display element to an extent proportionate to said current.

4. In a device of the character described, a movable color display element, a driving element, an electro-magnetic clutch acting between them and means to actuate the element in opposite direction when released by the clutch.

5. In a device of the character described, a movable color display element, a driving element adapted to be driven at constant speed, an electro-magnetic clutch acting between them and adapted to have a current of varying intensity passed therethrough, and means adapted to exert a force on said display element in opposed direction to said driving element.

6. In a device of the character described, a movable color display element, a driving element adapted to be driven at constant speed, an electro-magnetic clutch acting between them and adapted to have a current of varying intensity passed therethrough,

means adapted to exert a force on said display element in opposed direction to said driving element, and means for varying the force of said last mentioned means.

7. In a device of the character described, a rotary color display element, a rotary driving element coaxial therewith, an electromagnet carried by said display element and adapted to connect it to said driving element and further adapted to have a current of varying intensity passed therethrough, and means adapted to exert a force on said display element in opposed direction to said driving element.

8. In a device of the character described, a movable color display element normally occuping a predetermined position, variable drive means for moving said display element to a greater or less extent from said predetermined position, and means adapted to return said display element toward said predetermined position to a greater or less extent in opposition to said variable drive means.

9. In a device of the character described, a rotatable transparent, variably colored disk, means for reflecting light through the disk, drive means for rotating said disk, an electromagnetic clutch acting between the drive means and the disk for rotating the latter in one direction, and means connected with the disk for rotating it in a direction opposite to that of the drive when released by the clutch.

Signed at Bridgeport in the county of Fairfield and State of Connecticut this 29th day of March A. D. 1930.

WATSON H. WOODFORD.