Aug. 25, 1936. H. E. IVES 2,052,298

ELECTROOPTICAL SYSTEM

Filed April 2, 1930

FIG. 1

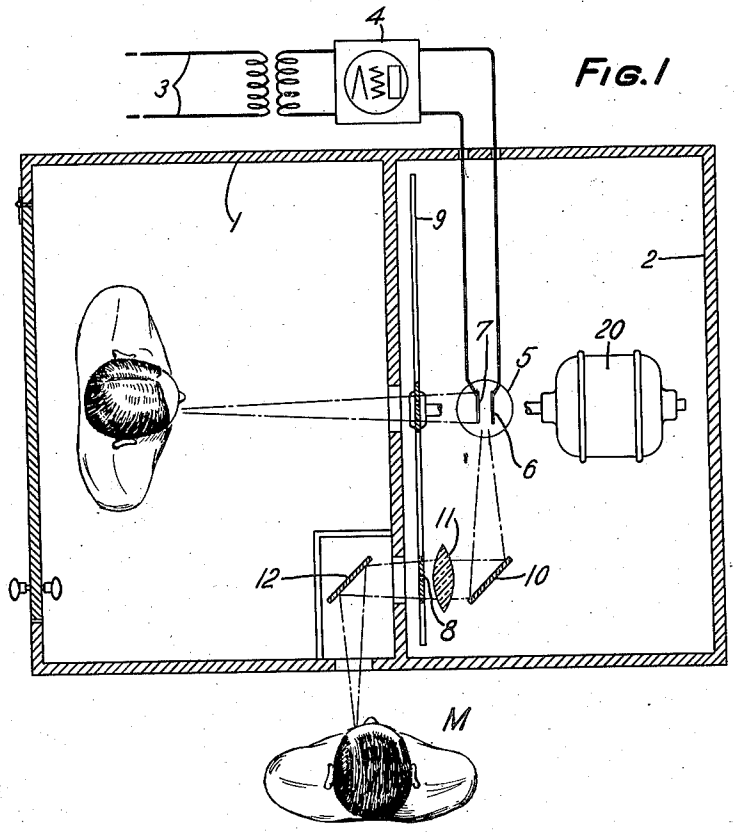
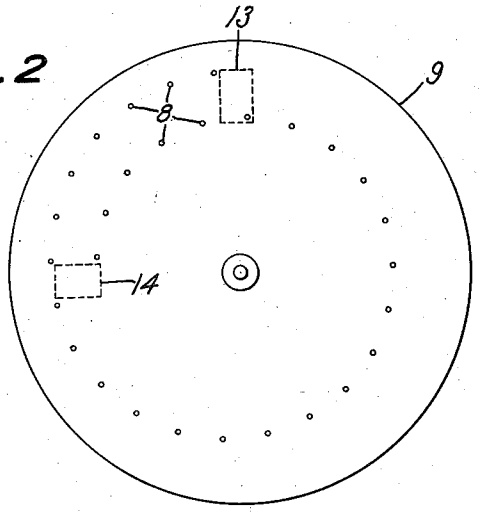


FIG. 2



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ELECTROOPTICAL SYSTEM

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16 Claims. (Cl. 178—6)

This invention relates to electro-optical systems and more particularly to arrangements for monitoring television reception.

It has been proposed, as disclosed in U. S. Patent 1,717,782, June 18, 1929 to Ives et al., to provide a television system with an arrangement for monitoring at the transmitting station. In the patented system, a certain amount of the outgoing image current is diverted, amplified and used to control a light source which is viewed through apertures in the disc used to scan the scene or object to be transmitted.

In certain types of television receivers, the incoming picture currents are used to control the intensity of the light supplied by a local source, which is viewed by an observer through apertures spirally arranged in a continuously moving scanning member operating in synchronism with a similarly apertured scanning member at a cooperating transmitting station.

One object of the present invention is to permit monitoring at a television receiving station which operates as described in the preceding paragraph.

Another object is to enable the reproducing light source to be viewed by an observer and a monitoring operator.

In one embodiment of the invention, the monitoring operator views the light source, which is viewed by the observer through a scanning member, by means of a mirror placed at one side of the source at approximately 45° to the plane of the scanning member and offset with respect to the observer's position. A lens is placed close to the scanning member and has a focal length such that the light source is imaged upon the pupil of the eye of the monitor through the apertured portion of the member corresponding to the offset position of the mirror.

A more detailed description of the invention follows and is illustrated in the attached drawing.

Fig. 1 illustrates a television receiver including the invention and Fig. 2 is a front view of part of the scanning disc showing the frame.

In order to determine whether a television receiving apparatus is operating satisfactorily it is essential that the operator in charge of the station be at all times in a position to monitor the reproduced image.

Any image monitoring by the station operator should be effected without reducing the amount of light supplied to the observer and without obstructing or interfering with him or his view of the image.

A system for accomplishing the object of the invention comprises an observer's booth 1, a cabinet 2 enclosing the receiving apparatus, and a monitoring apparatus which may be used by the operator without entering the booth.

Image currents received from a remote station are supplied through the circuit 3 to the amplifier 4 which may comprise any number of stages. The amplified image currents are impressed upon the light source, herein shown as a glow lamp 5.

Any suitable type of glow lamp, for example, a lamp of the design disclosed in Canadian Patent 326,606 of H. W. Weinhart, issued Oct. 11, 1932, by Weinhart, may be used. As therein disclosed, the lamp includes a cathode 6 having a large flat surface which is substantially completely covered by a negative glow, caused by the electric discharge from its anode 7 through the gas.

The amplified image currents cause the brilliancy of the glow area of the lamp to vary in accordance with changes in the amplitude of the current.

The observer 0 views the glow area of the lamp through a row of apertures or perforations 8 spirally arranged near the periphery of the rotating disc 9 driven by a motor 20. At the same time, light reflected by the mirror 10 is transmitted through a lens 11, perforations 8 of the disc 9 and the mirror 12 to the monitor M.

The mirror 10 is set at an angle of approximately 45° to the disc 9 and is offset with respect to the lamp 5, so that it is removed from the line of vision of the observer. The position of the mirror is such that it receives light radiated in the form of a wedge having its apex in the form of a thin line of light corresponding to the edge of the glowing layer within the lamp.

The lens 11 is of such focal length that it forms an image of the light reflected by the mirrors 10 upon the pupil of the monitor's eye over a path including the mirror 12. While the mirror 12 is provided as a means to determine one desirable monitoring position, it is not essential to the invention.

As is well known the disc 9 is controlled to rotate in synchronism with the scanning disc at the transmitting station. A suitable system for this purpose is disclosed in U. S. Patent 1,763,909 of Stoller and Morton issued June 17, 1930. Such apparatus is not a feature of the present invention, and hence it has not been illustrated.

Disc 9 is operated at such a rate of speed that an image, produced upon the retina of the observer's eye, is repeated at or above the rate of

persistence of vision, namely, about 16 to 20 times per second.

The frames 13 and 14, respectively, serve to determine the size of the image viewed by the observer and the monitor.

As the image viewed by the observer is produced by a spiral of apertures extending over 360°, it is necessary to provide a spiral of apertures at 360° in order to produce the image to be viewed by the monitor. It is also essential that, at any given instant, a similarly numbered aperture of the spiral controlling the production of the images should simultaneously pass before the field of vision of the observer and monitor. This could be effected by using two discs having two rows of spirals, one for the observer and one for the monitor.

However, as shown in Fig. 2, the disc 9 is provided with a spiral row of apertures which extend over 360° plus an angle corresponding to the offset position of the mirror 10. For example, if the mirror is offset 90°, the total angular length of the row of spirals is 450°. The frames 13 and 14 are provided with openings which are of such size and are so displaced radially with respect to each other that they are respectively traversed by apertures extending over a total angle of only 360°. The image seen by the monitor is identical with that viewed by the observer.

For the purpose of disclosing an operative apparatus for practicing the invention, specific devices and details have been described. However, it is to be understood that these specific features are merely typical and are not essential to the invention, for example, any suitable source of illumination may be used in place of the lamp 5 and any approved scanning member may be substituted for the disc 9.

What is claimed is:

1. A television receiving system comprising a light source, means for applying incoming image current to said source to thereby control the production of light rays varying as the tone values of a field of view scanned at a rate within the period of persistence of vision, an apertured member through the apertures of which rays from said source pass to set up an image, and means, utilizing other rays from said source and cooperating with the apertures of said member, for setting up a second image element by element simultaneously with the elements of said first image.

2. A television receiving system comprising a light source, means for applying incoming image current to said source to thereby control the production of light rays varying as the tone values of a field of view scanned at a rate within the period of persistence of vision, an apertured rotatable member through the apertures of which rays from said source pass to set up an image, and means, utilizing other rays from said source and cooperating with the apertures of said member, for setting up a second image element by element simultaneously with the elements of said first image.

3. A television receiving system comprising a source of light controlled by an incoming image current corresponding to a field of view scanned within the period of persistence of vision, an apertured rotating scanning element through the apertures of which light from said source passes to set up an image, means for simultaneously producing a second image including means for directing light from said source through a different one of said apertures than the one utilized at any instant in forming the first image.

4. A television receiving system comprising a source of light controlled by incoming image current, an apertured rotating scanning member, and means, including light directing means, for causing light to pass through a plurality of said apertures to simultaneously control the production of duplicate images.

5. A television receiver comprising an observer's booth, a source of light controlled by incoming image currents, an apertured scanning element outside said booth, and means for directing light from said source through a plurality of said apertures to simultaneously set up duplicate images, and means permitting one of said images to be viewed from a position outside said booth.

6. A television receiving system comprising a source of light controlled by incoming image current, an element for scanning light rays supplied by said source to set up an image, and means including said element for utilizing other light rays supplied by said source for setting up a second image simultaneously with said first image.

7. A television receiving system comprising an observer's booth, a source of light controlled by incoming image current, an element for scanning light from said source to set up an image observable within said booth, and light directing means cooperating with said source and said element to simultaneously set up a second image observable outside said booth.

8. A television image producer comprising an observer's booth, a source of light controlled by incoming image current, and a scanning means comprising an element having apertures and light control means which cooperate with the light source for causing light to simultaneously pass through a plurality of said apertures for respectively producing an image observable within said booth and simultaneously therewith a second image observable outside said booth.

9. Television apparatus for simultaneously setting up spaced images of the same object for separate viewing, comprising at a receiving station scanning means, said means comprising a rotatable element for scanning image modulated radiations, and means associated therewith for directing radiations having identical image modulations to be scanned by said element whereby the latter operates to control the simultaneous building up, in phase with each other, of a plurality of images spaced apart.

10. Television apparatus for the simultaneous production of a plurality of duplicate images comprising means for setting up radiations modulated under control of incoming image currents to be utilized in the production of said duplicate images, and rotatable scanning means carrying a plurality of spirally arranged means and light control means cooperating with said spirally arranged means for simultaneously selectively directing different portions of said radiations to set up corresponding strips of said duplicate images respectively.

11. Television apparatus for the simultaneous production of a plurality of duplicate images comprising means for setting up radiations modulated under control of incoming image currents to be utilized in the production of said images, and rotatable scanning means carrying a plurality of spirally arranged means and light control means cooperating therewith for simultaneously selectively directing different portions of said radiations to set up corresponding strips of said

images respectively, the number of said spirally arranged means being greater than the number of strips in each of said duplicate images.

12. A television apparatus including means for simultaneously producing a plurality of duplicate images comprising a source for producing radiations modulated in accordance with incoming image currents, means using certain of said image modulated radiations to set up an image field, and optical means, cooperating with said source and said first mentioned means, for utilizing other of said image modulated radiations radiated from a portion of said source which is restricted in area compared with that of an image field, to simultaneously set up at least one other image field, said optical means operating to direct said other radiations to said first mentioned means in the form of a beam of image field dimensions.

13. Television apparatus for the production of a plurality of images comprising means for producing radiations modulated under control of incoming image currents to be utilized in the production of said images, and rotatable scanning means having a plurality of spirally arranged means and light control means cooperating therewith for directing image modulated radiations to set up separate image fields respectively occupying different positions in the path of travel of said light directing means.

14. Television apparatus for the production of a plurality of images comprising means for producing radiations modulated under control of incoming image currents to be utilized in the production of said images, and rotatable scanning means having spirally arranged light apertures and light control means cooperating therewith for directing image modulated radiations to set up separate image fields respectively occupying different positions in the path of travel of said light apertures.

15. Television apparatus for the production of a plurality of images comprising means for producing radiations modulated under control of incoming image currents to be utilized in the production of said images, and rotatable scanning means having a plurality of spirally arranged means and light control means cooperating therewith for directing image modulated radiations to set up a plurality of image fields respectively observable by means of said light directing means travelling substantially vertically or by means of said light directing means travelling substantially horizontally.

16. Television apparatus for the production of a plurality of images comprising means for producing radiations modulated under control of incoming image currents to be utilized in the production of said images, and rotatable scanning means having a plurality of spirally arranged light apertures and light control means cooperating therewith for directing image modulated radiations to set up a plurality of image fields respectively observable through said light apertures travelling substantially vertically or through said light apertures travelling substantially horizontally.

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