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ELECTROOPTICAL SYSTEM

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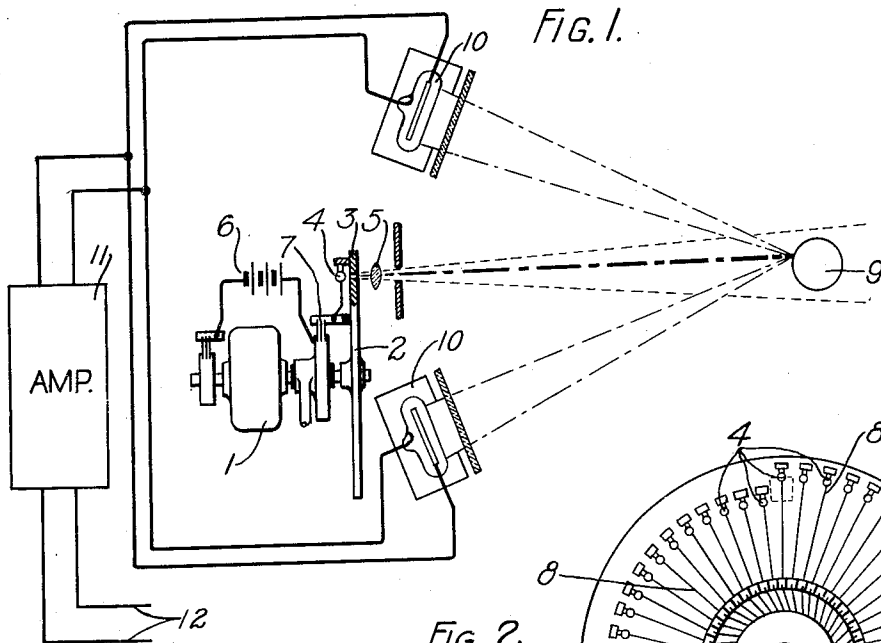


FIG. 2.

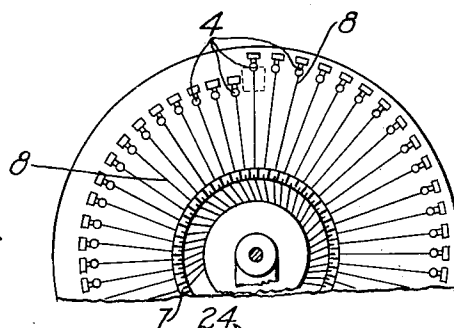


FIG. 4.

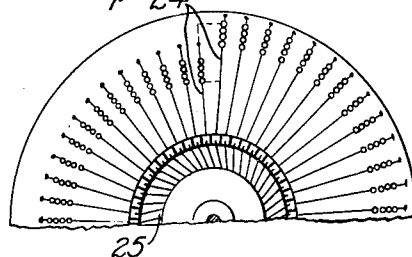
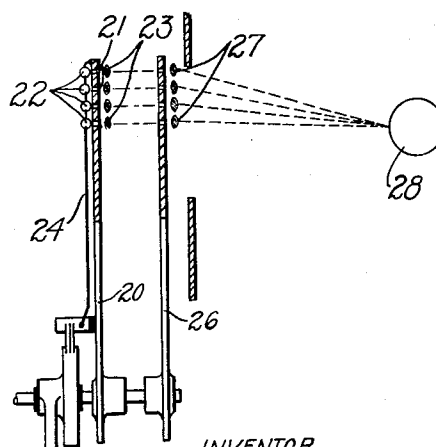


FIG. 3.



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ELECTROOPTICAL SYSTEM

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14 Claims. (Cl. 178—6)

This invention relates to electro-optical systems and more particularly to a method of and means for illuminating and scanning objects for television transmission.

5 An object of the invention is to enable separate light sources to be used to effect beam scanning of an object.

In the prior art, beam scanning of an object has been effected by using a single light source to supply light to a rotating disc provided with a number of apertures arranged in a spiral row.

As the disc rotates a beam of intense light passes through the successive apertures to traverse and illuminate adjacent strips of the field to be scanned and the variations in the light reflected from its elemental area are applied to a photo-electric cell, or system of cells, adapted to produce image currents which are transmitted to the receiving station.

20 A system of the type described above is disclosed in application Serial No. 227,649, filed October 21, 1927 by F. Gray, which is a continuation of application Serial No. 181,538, filed April 6, 1927, and which in turn is a continuation of application Serial No. 111,731, filed May 26, 1926. The present application is a continuation in part of each of these three applications.

A preferred embodiment of the present invention comprises a scanning mechanism including a movable element carrying a number of separate light sources mounted in a spiral line. The movable element may be a disc which is rotated to cause the light supplied by the respective sources to traverse and illuminate successive adjacent strips of the field.

A suitable optical system is used between the disc and the field to concentrate the light supplied by the respective sources into a beam, as these sources successively traverse the scanning area.

The light sources may each consist of one or more electric lamps mounted upon the face of the disc adjacent the object, or they may be secured to the face of the disc remote from the object and each in line with an aperture or a lens therein.

A plural lamp structure may comprise two or more lamps mounted in a radial line on a rotating disc, to supply a plurality of pencils of light.

50 An optical system is provided to concentrate the pencils of light upon correspondingly positioned apertures arranged in a spiral line on a second disc, which is rotated at the same rate as the first disc.

A lens system is provided to merge the pencils of light, passing through the apertures in the second disc, into a single beam for scanning the object, or a lens may be mounted in each perforation.

60 The lamp or lamps constituting a light source

may be energized at all times, or a commutator may be used to supply energizing current to each source, as it passes across the scanning area. That is, all light sources may be dark except the one traversing the scanning area.

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

Fig. 1 illustrates a television transmitter embodying the invention;

Fig. 2 is an enlarged view of a scanning disc which may be used in the transmitter;

Fig. 3 is similar to Fig. 1, but illustrates a multiple lamp system, and

Fig. 4 is a detail of the disc of Fig. 3.

The transmitting apparatus of Fig. 1 comprises a motor 1 for driving a disc 2 provided with a spiral row of apertures 3.

Mounted upon one face of the disc 2 adjacent each of the apertures 3 is a lamp 4.

In front of the disc 2 is a lens 5 which concentrates the light passing through the apertures 3 as they successively traverse the field of the lens into a beam of great intensity.

A battery or other suitable current source 6 is connected to the lamps 4 in succession through a commutator 7, as the disc 2 is rotated.

As shown in Fig. 2 each lamp 4 is connected by a lead 8 to a segment of the commutator 7. The segments are of such dimension and are so arranged that each lamp is supplied with current, and hence is lighted, during the time it passes across the lens 5.

As the disc 2 rotates each lamp 4 cooperates with the lens 5 to produce an intense spot of light which illuminates transverse lines of the object or field. The apertures are arranged so close to each other in a radial direction, that closely adjacent lines of the object 9 are illuminated by successive lamps and the object is completely illuminated during each revolution of the disc.

Light, corresponding to the tone values of the successive elemental areas of the object 9 is reflected upon the photoelectric cells 10, which are arranged to operate as disclosed in the above mentioned application Serial No. 227,649 and which are connected in parallel to the input circuit of an amplifier 11.

The current supplied by the photoelectric cells 10, after being raised to the desired power level in the amplifier 11, is supplied to a circuit 12. This may be a transmission line or the input circuit of a radio transmitter.

Figs. 3 and 4 illustrate a combined light source and scanning disc which may be substituted for that described above.

The substitute apparatus comprises a disc 20 provided with a spiral row of openings each of which is composed of four apertures 21.

Mounted on the rear face of the disc 20 and adjacent to each perforation is a lamp 22.

Close to the front face of the disc 20 are four lenses 23, each associated with a spiral row of openings to concentrate the light passing the respective apertures.

5 The lamps constituting a radial row are connected together and by leads 24 to the successive segments of a commutator 25, as shown in Fig. 4.

10 In front of the lenses 23 is a second disc 26 similar in every particular to the disc 20.

15 In front of the disc 26 is a second set of lenses 27 having such focal lengths and their focal axes so adjusted with respect to each other that the pencils of light passing through the radial rows of perforations in disc 26 converge to constitute a spot of light at the surface of the object 28.

20 The discs 20 and 26 are parallel to each other, are mounted upon the same shaft and are driven by the same motor. The operation of these discs to effect scanning of the object 28, is similar to that of the disc 2. If each of the lamps 22 supply light of the same intensity as each of the lamps 4, the intensity of the scanning spot will be increased to four times that obtained with the system of Figs. 1 and 2.

25 By properly masking the scanning mechanism in either of the systems herein described, the lamp may be secured in the perforations or at corresponding points on the front face of the disc 2 or 20.

30 Any suitable scanning element other than a disc may be used, as well as any type of lamp. In the system of Figures 3 and 4, the radial rows may include any number of lamps and cooperating perforations within reason. The amplifier may be of any desired type, provided it operates to amplify the image currents without distortion.

35 What is claimed is:

1. The method of operating an electro-optical apparatus including a light source and light sensitive electric means which comprises energizing the source to produce light radiations, concentrating said radiations into a beam, moving the source to cause the beam to sweep a field to be scanned, and utilizing light reflected from the field to activate the light sensitive means.

45 2. The method of operating an electro-optical apparatus including a plurality of primary light sources and light sensitive electric means which comprises energizing the sources to produce light radiations, concentrating the radiations from each source to constitute a beam, moving the sources to cause the beams produced by the sources to successively sweep a field to be scanned, and utilizing light reflected from the field to activate the light sensitive means.

50 3. An electro-optical apparatus comprising a primary light source, means for producing a light beam from the radiations of said source, means for moving said source to cause said beam to traverse a field to be scanned, and light sensitive electric means activated by light reflected from said field.

65 4. An electro-optical apparatus comprising primary light sources, means for concentrating the light radiations from each source into a beam, means for moving said sources to cause said beams to traverse a field to be scanned, and light sensitive electric means activated by light reflected from said field.

70 5. An electro-optical apparatus comprising primary light sources, means for concentrating the light radiations from each source into a beam,

means for moving said sources to cause said beams to traverse different lines of a field to be scanned, and light sensitive electric means activated by light reflected from said field.

80 6. An electro-optical apparatus comprising primary light sources, means for concentrating the light radiations from each source into a beam, means for moving said sources to cause said beams to traverse successive lines of a field to be scanned, and light sensitive electric means activated by light reflected from said field.

85 7. An apparatus for scanning an object for transmission comprising primary light sources, means for concentrating the light radiations from each source into a beam, means carrying said sources for causing said beams to scan an object, and light sensitive electric means activated by light reflected from said object.

90 8. An apparatus for scanning an object for transmission comprising primary light sources, means for concentrating the light radiations from each source into a beam, means carrying said sources for causing said beams to illuminate different lines of an object to be transmitted, and light sensitive electric means activated by light reflected from said object.

100 9. An apparatus for scanning an object for transmission comprising primary light sources, means for concentrating the light radiations from each source into a beam, means carrying said sources for causing said beams to illuminate successive lines of an object to be transmitted, and light sensitive electric means activated by light reflected from said object.

105 10. A television transmitter comprising primary light sources, means for concentrating light radiations from a plurality of said sources into a beam, means for carrying said sources across the field of the concentrator to effect spot illumination of an object, and light sensitive electric means activated by light reflected from said object.

115 11. A television transmitter comprising primary light sources, energizing means therefor, means for concentrating light radiations from a plurality of said sources into a beam, means for connecting said energizing means successively to said sources which are carried across the field of the concentrating means to illuminate an object, and light sensitive electric means activated by light reflected from said object.

125 12. An electro-optical apparatus comprising a primary light source, a member carrying said source, means for producing a beam of light from said source, means for rotating said member to cause said beam to traverse a field to be scanned, and light sensitive means activated by light reflected from said field.

130 13. An electro-optical apparatus comprising a plurality of primary light sources, a member carrying said sources, means for concentrating the light from each of said sources into a beam, means for rotating said member to cause said beams to traverse different lines of a field to be scanned, and light sensitive electric means activated by light reflected from said field.

140 14. A television transmitter comprising primary light sources, a member carrying said sources, means for concentrating light rays from a plurality of said sources into a beam, means for rotating said member to carry said sources across the field of the concentrator to effect spot-illumination of an object, and light sensitive electric means activated by light reflected from said object.

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