

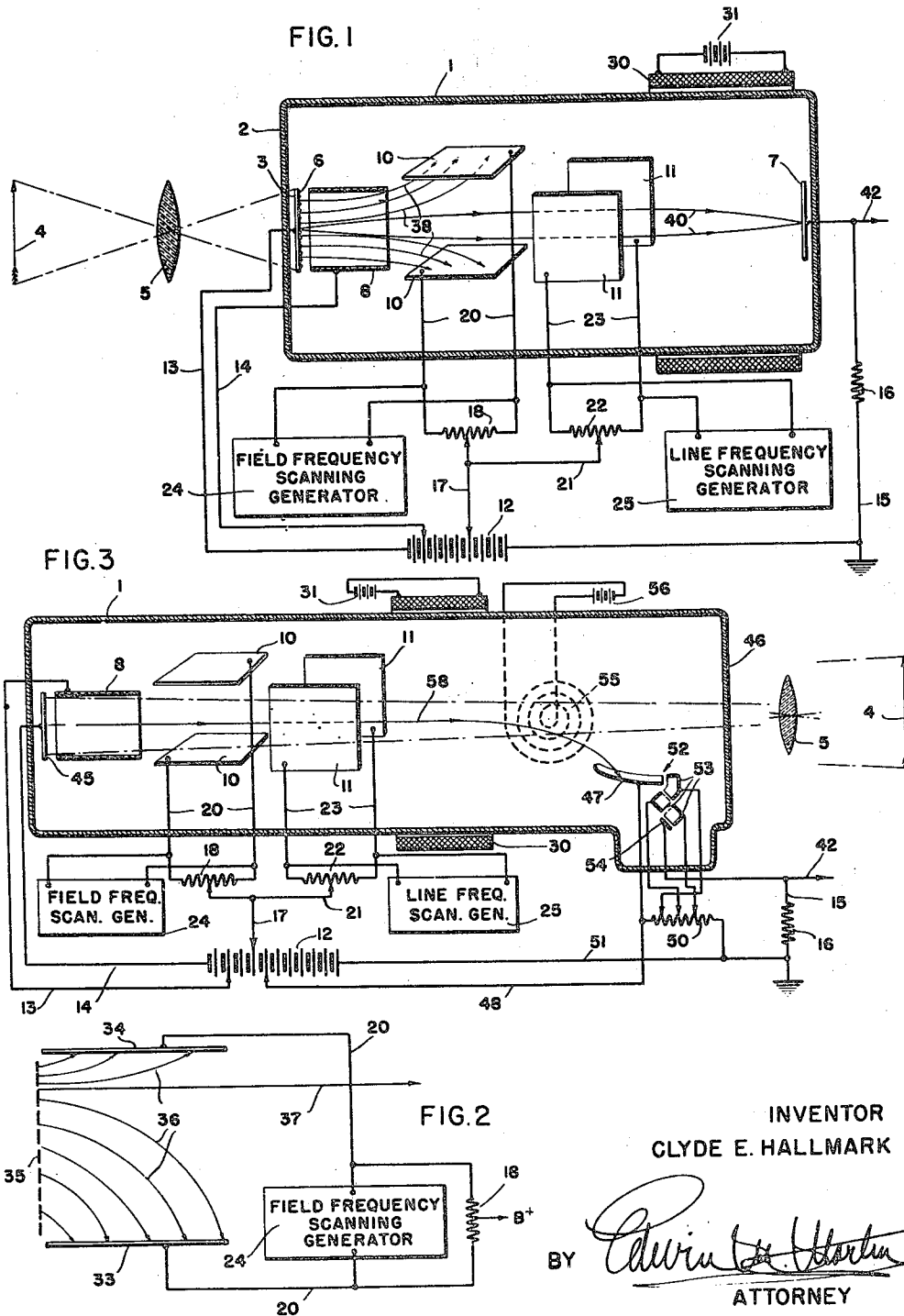
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IMAGE DISSECTOR TUBE

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IMAGE DISSECTOR TUBE

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1

This invention relates generally to television systems and particularly to picture signal generating tubes.

Conventional image dissector tubes comprise a photosensitive cathode upon which the light image to be transmitted is projected. The light causes photoelectrons to be emitted by the photosensitive cathode representative of the light image, and the resulting stream of photoelectrons is directed towards a collecting anode. In order to effect scansion of the stream of photoelectrons, electromagnetic deflecting means have usually been provided. By means of this arrangement the stream of photoelectrons is bodily deflected in accordance with a predetermined scanning pattern. An aperture provided in a shield surrounding the collector anode defines the size of the elemental area of the photoelectric cathode from which electrons reach the collector anode at any particular instant. The magnetic field created in the dissector tube varies for deflecting the photoelectron stream according to the scanning pattern. In this manner, successive areas of the cathode are scanned to provide for a complete scansion thereof.

It has also been proposed to utilize electrostatic fields for effecting deflection of the electrons in accordance with a scanning pattern. Also in this case the stream of photoelectrons representing the image to be transmitted is bodily deflected, and hence substantially all photoelectrons are simultaneously directed towards the collector anode, necessitating the use of an aperture arranged in a shield surrounding the collector anode to define the size of the individual picture elements.

In many cases it is desirable to control the size of the scanning aperture. However, with the conventional image dissector tube this can not be done without taking the tube apart. To overcome this drawback, an electrical aperture has been suggested where the effective size of the elemental area of the cathode scanned at any instant is varied by electron-optical means. To this end it has been proposed to utilize an anode structure including a number of apertured plates which are supplied with suitable electric potentials for varying the electric field strength between the plates, thereby to deflect and return a larger or smaller number of electrons and thus control the size of the electron pencil passing through the apertured anode structure. However, also in this case the collector anode has to be provided with a shield for preventing the unselected or undesired electrons from reaching

2

the anode. This electrical aperture associated with the anode does not form part of the conventional electron deflecting means provided for effecting deflection of the electric image in accordance with the scanning pattern and, therefore, two separate electric or magnetic fields must be created in the tube and controlled or adjusted separately.

The primary object of the present invention, therefore, is to provide a picture signal generating tube where an electron image representative of the light image to be transmitted is deflected in such a manner that at any instant electrons from only a selected incremental area of the cathode will reach the collector anode, while electrons from other areas of the cathode are dispersed away from the collector anode.

Another object of this invention is to provide novel means in a picture signal generating tube for electron-optically controlling the size of the incremental area of the cathode from which at any instant electrons are able to reach the collector anode.

In accordance with the present invention, there is provided a television picture signal generating device comprising a photoelectric cathode for creating an electron image when a light image is projected thereon. Electron deflecting means are arranged adjacent the path of the electron image created by the photoelectric cathode for dispersing and attracting electrons from all but one of the incremental areas of the electron image. A collector electrode is disposed to receive only electrons from that one incremental area of the electron image.

In another embodiment of the invention, the photoelectric cathode is arranged at one end of an evacuated envelope while the light image to be transmitted is projected through the other end of the envelope. The electron image emitted by the cathode is accelerated by an electrode, and two pairs of deflecting plates are arranged so as not to interfere with the light projected toward the cathode. The collector anode positioned in the envelope is also arranged so as not to interfere with the light. The two pairs of plates are operatively connected with deflection control means for applying a variable electric potential to said plates for creating a variable divergent electric field pattern to select electrons from successive incremental areas of the electron image in accordance with a predetermined scanning pattern and to pass the selected electrons between the two pairs of plates while deflecting and dispersing substantially all other

3

electrons toward the plates. A constant electron deflecting field is provided for directing the selected electrons toward the anode.

This arrangement is particularly advantageous because the collecting anode may be positioned at any convenient place while the selected electrons can be deflected toward the anode. This is made possible because at any instant all unselected electrons are dispersed and deflected away from the collector anode and preferably are collected by the electrostatic plates so that only selected electrons pass between the electrostatic plates. These selected electrons can then be deflected in any desired direction without interference from the dispersed electrons.

For a better understanding of the invention, together with other and further objects thereof, reference is made to the following description, taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the accompanying drawing:

Fig. 1 is a schematic diagram of a picture signal generating tube embodying the present invention and connected in circuit for generation of television signals;

Fig. 2 is a schematic representation of electric lines of force which are created at a particular moment in the tube of the invention; and

Fig. 3 is a schematic diagram of a modified tube in accordance with the present invention.

Referring now more particularly to Fig. 1, there is provided a picture signal generating tube having an evacuated envelope 1 including a plane optical window 2. A photoelectric cathode 3 is positioned in the envelope 1 adjacent the window 2. An optical image or scene represented by an arrow 4 is focused on the photoelectric cathode 3 by an optical lens system 5. The photoelectric cathode 3 is transparent or translucent and bears a photosensitive layer 6 on its surface facing a collector anode 7. The collector anode 7 is positioned at the other end of the envelope 1 and arranged to receive selected photoelectrons from the cathode 3. An accelerating electrode 8 is arranged adjacent the cathode 3 and is preferably of cylindrical shape. Two pairs of electrostatic deflecting plates 10, 10 and 11, 11 are provided in the envelope 1 between the accelerating electrode 8 and the collector anode 7. Plates 10 and 11 are positioned at right angles to each other. Preferably, plates 10 and 11 are displaced longitudinally from each other.

The photoelectric cathode 3 is connected with the negative terminal of a source of potential such, for example, as a battery 12 through a lead 13. A lead 14 connected to the battery 12 as shown keeps the accelerating electrode 8 at a positive potential with respect to the cathode 3. The positive terminal of the battery 12 is grounded and connected to the collector anode 7 through a lead 15 and an output resistor 16.

Electrostatic deflecting plates 10 and 11 are supplied with a positive potential with respect to the cathode 3. To this end a lead 17 connects the battery 12 as shown with an adjustable slider contact of a resistor 18. The two terminals of the resistor 18 are connected through leads 20, 20 with plates 10, 10. Similarly plates 11, 11 are kept at the same potential as plates 10, 10 through a lead 21 connected to the lead 17 and to an adjustable slider contact of a resistor 22, the terminals of which are connected to plates 11, 11 through leads 23, 23. It will be seen that the

4

collector anode 7 is kept at a slightly higher positive potential than plates 10 and 11.

Each set of plates 10 and 11 is supplied with a voltage alternating in accordance with a predetermined scanning pattern. To this end a field frequency scanning generator 24 is connected to leads 20, 20 and hence to plates 10, 10. The generator 24 supplies a voltage to plates 10, 10 alternating according to the field scanning frequency. Plates 11 are supplied with the line scanning frequency from a line frequency scanning generator 25 through leads 23, 23. It will be understood that the operation of the picture signal generating tube embodying the invention is not dependent upon which of plates 10 or 11 is supplied with the line scanning frequency and the field scanning frequency. When plates 10 and 11 are spaced longitudinally from each other as shown in Fig. 1, their electric fields will not disturb each other.

A magnetic focusing coil 30 is arranged outside the envelope 1 and supplied with energy from a source of potential such, for example, as battery 31. This coil generates a constant magnetic field for focusing the selected electrons upon the collector anode 7.

Referring now to the operation of the picture signal generating tube illustrated in Fig. 1, an optical image of the scene or object 4 is projected on the cathode 3 by the optical system 5. Through the action of the light on the photosensitive surface 6, photoelectrons are emitted to form an electron image which moves under the influence of the field generated by the accelerating electrode 8 towards the collector anode 7. The geometric arrangement of the accelerating electrode 8 and the electrostatic deflecting plates 10 and 11 is such that the electric fields created by the voltages supplied to the accelerating electrode 8 and plates 10 and 11 are divergent. Accordingly, the photoelectrons emitted by the photoelectric cathode 3 are subjected to this divergent electrostatic field.

The action of this divergent field can best be explained by reference to Fig. 2. In Fig. 2 electrostatic plates 33 and 34 corresponding, for example, to plates 10, 10 of Fig. 1 have been shown connected by leads 20, 20 to the field frequency scanning generator 24. The connection of the resistor 18 to the battery 12 has been indicated schematically. The accelerating electrode 8 has been replaced by an equivalent screen 35 to simplify the following explanation. Actually the electric lines of force created by a cylindrical accelerating electrode are not straight but slightly curved and, therefore, a screen has been substituted in Fig. 2 which creates straight electric lines of force. We may assume that the screen 35 has applied thereto an accelerating potential of 50 volts while the potential supplied to plates 33, 34 from the battery 12 may, for instance, be 250 volts. All voltages are referred to the same reference potential and are given here with respect to the photoelectric cathode 3. The constant potential supplied to plates 33, 34 should be such that at no time either of the plates 33 or 34 has a lower potential than the screen 35. By means of the generator 24 a variable voltage is supplied to plates 33, 34. At a particular moment the plate 34 may have applied thereto a potential of 60 volts and the plate 33 a potential of 440 volts. These voltages result from the generator 24 adding 190 volts to the voltage supplied from the battery to the plate 33 and subtracting 190 volts from the voltage supplied from the battery to the plate

34. The electric lines of force 36 produced by such an electric field have been shown schematically in Fig. 2. It will be seen that most of the electric lines of force are bent toward the plate 33 while a few are deflected toward the plate 34 resulting from the weaker electric field between the screen 35 and the plate 34. Between the two opposed electric fields there is a neutral zone and one electric line of force indicated at 37 is substantially undeflected.

The photoelectrons emitted from the surface 6 of the cathode 3 have a tendency to follow the electric lines of force 36 illustrated in Fig. 2. Therefore, with respect to electrode 10, the paths of the electrons substantially follow curves 38 shown in Fig. 1. Hence, it will be evident that at any particular moment most photoelectrons emitted from the cathode 3 and comprising the electron image will be dispersed and deflected away from a straight path and substantially all of these electrons will be deflected toward plates 10 as illustrated in Fig. 1. However, at any instant, electrons from a certain selected horizontal line area of the electron image will pass between plates 10, 10 substantially undeflected.

Fig. 2 is also illustrative of the fields of force generated between plates 11, 11 except that the potentials on these plates vary at the line scanning rate. Thus, at any particular instant, most of the photoelectrons passing out of the field of plates 10, 10 into the field of plates 11, 11 are dispersed and deflected away from a straight path under the influence of lines of force similar to those indicated in Fig. 2. However, electrons from a certain selected area pass between plates 11 substantially undeflected whereby at any instant, electrons from only certain incremental areas of the electron image will pass between plates 10, 10 and 11, 11 while substantially all other electrons will be deflected toward plates 10, 10 and 11, 11 to be eventually collected thereby.

The effective size of the aperture, that is, the size of the elemental area of the cathode 3 from which electrons reach the anode 7 at any instant depends upon the electric fields created by the various electrodes in the envelope 1. More particularly the effective size of the aperture is inversely proportional to the ratio of the mean voltage applied to electrostatic deflecting plates 10 and 11 and the unidirectional voltage applied to the accelerating electrode 8. The mean voltage applied to deflecting plates 10 and 11, averaged over a scanning cycle, is equal to the voltage supplied from the source 12 through leads 20 and 23 to plates 10 and 11, respectively. When this ratio becomes larger, that is, when for instance the voltage applied to the accelerating electrode 8 is decreased, the effective size of the aperture is reduced. This can be explained in the following manner. By decreasing the voltage applied to the accelerating electrode 8, the speed of the electrons is reduced and therefore they can be deflected more easily. This can be accomplished by adjusting the tap connecting the battery 12 to the lead 14. The same effect can also be obtained by keeping the voltage on the accelerating electrode 8 constant and increasing the mean voltage applied to plates 10 and 11. This adjustment is effected through the tap connecting the battery 12 to the lead 17. This also decreases the effective size of the aperture because now the deflecting fields become stronger resulting in a deflection of more electrons than previously.

The effective size of the aperture, that is, the size of the elemental area of the cathode from

which electrons reach the collector anode 7 is thus adjusted or controlled through the electron deflecting means. No mechanical aperture is provided, and the effective size of the aperture is defined solely by electrical fields created by the potentials supplied to the accelerating electrode 8 and plates 10, 11.

The electric fields between plates 10 and 11 vary constantly in accordance with the field and line scanning patterns. Therefore, at any particular instant electrons emitted from a different incremental area of the cathode 3 are able to pass between plates 10, 10 and 11, 11 because the electric lines of force change their direction all the time as illustrated in Fig. 2. Thus all portions of cathode 3 are scanned successively.

Those electrons which have been selected at any particular instant are able to pass between both plates 10 and 11 and will finally reach the collector anode 7. A television signal train is thus developed across the output resistor 16, and the signal may be taken from the output terminal 42. The output signal may be amplified in any desired and conventional manner. It is also feasible to combine the collector anode with a conventional electron multiplier, such as will be described hereinafter, in connection with Fig. 3.

The magnetic coil 30 generates a constant magnetic field for focusing the selected electrons upon the collector anode 7. However, it will be appreciated that no sharp focusing of the selected electrons is necessary as long as substantially all selected electrons reach the collector anode 7. In some cases it may be desirable to dispense with the focusing coil 30.

Referring now to Fig. 3, in which like components are designated by the same reference numerals as were used in Fig. 1, it will be seen that the accelerating electrode 8 and deflecting plates 10 and 11 are the same in Fig. 3 as in Fig. 1. Fig. 3 differs from Fig. 1 by the arrangement of the light projecting means with respect to cathode 45. The cathode 45 is arranged at one end of the evacuated envelope 1 which is provided at its opposite end with a plane optical window 46. A light image of the scene 4 is projected by the optical lens system 5 on the cathode 45 through the window 46. The optical path of the light has been shown diagrammatically only due to the limited space of the drawing. The photoelectric cathode 45 has its photo-sensitive layer opposite the window 46, and hence it will be seen that the cathode 45 need not be transparent.

The cathode 45 and the accelerating electrode 8 are connected with the battery 12 in the manner described in connection with Fig. 1. Similarly the electrical potentials applied to plates 10 and 11 are connected in the same way as in Fig. 1, and hence need not be described here. The magnetic focusing coil 30 connected to the battery 31 is provided outside the envelope 1 for creating a constant magnetic field which serves for focusing the selected electrons.

A collector anode or target 47 is associated with an electron multiplier 52 including a number of secondary-electron-emitting electrodes 53. The target 47 is connected to the battery 12 through a lead 48 and is kept at a higher positive potential than plates 10 and 11. A voltage divider 50 is connected to the battery 12 by leads 48 and 51. The lead 51 connects the positive terminal of battery 12 to ground as shown. The secondary-electron-emitting electrodes 53 receive their potentials from taps on the voltage divider 50. An electron collector 54 collects the multiplied

electron current and is connected with the output terminal 42. The output signal is developed across the grounded output resistor 16 in the same manner as explained in connection with Fig. 1.

A pair of magnetic deflecting coils, one of which is indicated at 55, is arranged parallel to the plane passing through the cathode 45 and the collector anode or target 47. Magnetic deflecting coils 55 are supplied with energy from a battery 56 and generate a transverse magnetic field in envelope 1.

The picture signal generating tube illustrated in Fig. 3 operates essentially in the same manner as the tube of the invention shown in Fig. 1. The light image projected on the photoelectric cathode 45 through the lens 5 causes a stream of photoelectrons to be emitted which is accelerated by the electrode 8. This stream of photoelectrons constitutes an electron image. Plates 10 and 11 create divergent electrostatic fields for selecting electrons from predetermined elemental areas of the electron image in the manner described hereinabove. The electrons selected at any particular instant pass between plates 10 and 11 and are then focused by the magnetic coil 30 which generates a constant magnetic focusing field.

These selected electrons would ordinarily hit the window 46 instead of the target 47. In order to direct the selected electrons toward the target 47, there are provided magnetic deflecting coils 55 which create a transverse magnetic field. The path of the selected electrons is shown diagrammatically by curve 58. These selected electrons which hit the target 47 are then multiplied by the electron multiplier 52, and a train of television signals is derived from the electron collector 54. The television picture signals are impressed across the output resistor 16, and the output signal is obtained through the output terminal 42.

By means of this arrangement it is possible to project the light image between plates 11 and 10 and through the cylindrical accelerating electrode 8 onto the photoelectric cathode 45. A picture signal generating tube of this type is sometimes more advantageous than the one shown in Fig. 1 because it is not necessary to use a transparent or translucent photoelectric cathode. The target 47 and its associated electron multiplier 52 may be arranged at any convenient place out of the path of the light projected toward the photoelectric cathode 45. The selected electrons can be deflected toward the target 47 by magnetic deflecting coils 55 or by a suitable electrostatic field. This deflection of the electrons from the selected elemental areas of the cathode is made possible because substantially all undesired electrons are dispersed toward plates 10 or 11 and, therefore, only selected electrons are able to pass between plates 11.

While there has been described what are at present considered the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A television picture signal generating device comprising a photoelectric cathode for emitting an electron image when a light image is pro-

jected thereon, means including a device for developing a cyclically varying divergent electrostatic field to disperse the electrons of said image in predetermined divergent paths to select electrons in a predetermined incremental area thereof and a collector electrode for collecting said selected electrons from said predetermined incremental area of said electron image.

2. A television picture signal generating device comprising a photoelectric cathode for emitting an electron image when a light image is projected thereon, electron deflecting and collecting means extending along the path of electron emission from said cathode for deflecting the electrons of said electron image in predetermined divergent paths and collecting electrons from all but successively selected incremental areas of said electron image and a collector electrode for collecting electrons from said successively selected incremental areas of said electron image.

3. A television picture signal generating device comprising a photoelectric cathode for emitting an electron image when a light image is projected thereon, unitary electron deflecting and collecting means arranged adjacent the path of electron emission from said cathode for deflecting said electron image and collecting at any one instant electrons from all but a selected one of the incremental areas of said electron image and a collector electrode disposed to collect electrons from said selected incremental area of said electron image.

4. A television picture signal generating device comprising an evacuated envelope including a photoelectric cathode for emitting an electron image when a light image is projected thereon, electron deflecting means arranged in said envelope adjacent the path of electron emission from said cathode, means for applying a variable electric potential to said deflecting means for creating a variable divergent electric field pattern to select electrons from successive areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said deflecting means while dispersing substantially all other electrons toward said deflecting means and a collector anode disposed in said envelope to receive the electrons passed by said deflecting means.

5. A television picture signal generating device comprising an evacuated envelope including a photoelectric cathode for emitting an electron image when a light image is projected thereon, two pairs of plates arranged in said envelope adjacent the path of electron emission from said cathode, means for applying a variable electric potential to said plates for creating a variable divergent electric field pattern to successively select electrons from elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said plates while deflecting substantially all other electrons toward said plates, and a collector anode disposed in said envelope to receive the electrons passed between said plates, thereby to provide for a complete scan of said electron image in accordance with said scanning pattern.

6. A television picture signal generating device comprising an evacuated envelope including a photoelectric cathode for emitting an electron image when a light image is projected thereon, an electrode for accelerating said electron stream arranged adjacent said cathode, electron deflecting and collecting means arranged in said enve-

lopes adjacent the path of electron emission from said cathode, means for applying a variable electric potential to said deflecting means for creating a variable divergent electric field pattern between said electrode and said deflecting means to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons while dispersing substantially all other electrons toward said deflecting means, a collector anode disposed in said envelope to receive the electrons passed by said deflecting means, and means for varying the strength of the electric field between said electrode and said deflecting means for controlling the size of said successive elemental areas, thereby to control the effective size of the scanning aperture.

7. A television picture signal generating device comprising an evacuated envelope including a photoelectric cathode for emitting an electron image when a light image is projected thereon, an electrode for accelerating said electron stream arranged adjacent said cathode, two pairs of plates arranged in said envelope adjacent the path of electron emission from said cathode, means for applying a variable electric potential to said plates for creating a variable divergent electric field pattern between said electrode and said plates to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said plates while deflecting and collecting substantially all other electrons to provide for a complete scansion of said electron image, a collector anode disposed in said envelope to receive the electrons passed between said plates, and a device for adjusting the strength of the electric field between said electrode and said plates for controlling the size of said successive elemental areas, thereby to control the effective size of the scanning aperture.

8. A television picture signal generating tube comprising an evacuated envelope including a photoelectric cathode for producing an electron image when a light image is projected thereon, an electrode for accelerating said electron stream arranged adjacent said cathode, means for supplying a constant voltage to said electrode, two pairs of plates arranged in said envelope, means for supplying a constant voltage to each of said plates, means for supplying an alternating voltage to each pair of said plates for creating a variable divergent electric field pattern to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said plates while deflecting substantially all other electrons toward said plates to provide for a complete scansion of said electron image, a collector anode disposed in said envelope to receive the electrons passed between said plates, said alternating voltage being varied in accordance with said scanning pattern, and a device for adjusting the constant voltage supplied to said electrode and to said plates for controlling the size of said successive elemental areas, thereby to control the effective size of the scanning aperture.

9. A television picture signal generating tube comprising an evacuated envelope including a translucent photoelectric cathode, a collector anode positioned in said envelope opposite said cathode, means for projecting a light image upon said cathode from a direction opposite said anode to produce an electron image, a plurality of de-

flecting elements positioned in said envelope between said cathode and said collector anode, and means for applying a variable potential to said elements for creating a variable divergent electric field pattern to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said deflecting elements while deflecting substantially all other electrons toward said deflecting elements, thereby to provide for a complete scansion of said electron image in accordance with said scanning pattern.

10. A television picture signal generating tube comprising an evacuated envelope including a photoelectric cathode arranged at one end of said envelope, means for projecting a light image through the other end of said envelope toward said cathode to produce an electron image, deflecting means arranged so as not to interfere with the light projected toward said cathode, a collector anode positioned in said envelope and arranged so as not to interfere with said light, control means operatively connected with said deflecting means for applying a variable electric potential thereto for creating a variable divergent electric field pattern to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons while deflecting substantially all other electrons toward said deflecting means to provide for a complete scansion of said electron image, and means for creating a constant electron deflecting field to direct said selected electrons toward said anode.

11. A television picture signal generating tube comprising an evacuated transparent envelope including a photoelectric cathode arranged at one end of said envelope, means for projecting a light image through the other end of said envelope toward said cathode to produce an electron image, two pairs of plates arranged in said envelope so as not to interfere with the light projected toward said cathode, a collector anode positioned in said envelope and arranged so as not to interfere with said light, an electrode for accelerating said electron stream arranged adjacent said cathode, means for supplying a constant voltage to said electrode, deflection control means operatively connected with said plates for applying a variable electric potential to said plates for creating a variable divergent electric field pattern to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said plates while deflecting substantially all other electrons toward said plates to provide for a complete scansion of said electron image, means for creating a constant electron deflecting field to direct said selected electrons toward said anode, and a device for adjusting the strength of the electric field between said electrode and said plates for controlling the size of said successive elemental areas, thereby to control the effective size of the scanning aperture.

12. A television picture signal generating tube comprising an evacuated transparent envelope including a photoelectric cathode arranged at one end of said envelope, means for projecting a light image through the other end of said envelope toward said cathode to produce an electron image, two pairs of plates arranged in said envelope so as not to interfere with the light projected toward said cathode, a collector anode positioned in

11

said envelope and arranged so as not to interfere with said light, an electrode for accelerating said electron stream arranged adjacent said cathode, means for supplying a constant voltage to said electrode, deflection control means operatively connected with said plates for applying a variable electric potential to said plates for creating a variable divergent electric field pattern to select electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern and to pass said selected electrons between said plates while deflecting substantially all other electrons toward said plates to provide for a complete scansion of said electron image, means for creating a constant electron deflecting field to direct said selected electrons toward said anode, means for focusing said selected electrons, and a device for adjusting the strength of the electric field between said electrode and said plates for controlling the size of said successive elemental areas, thereby to control the effective size of the scanning aperture.

13. In a picture analyzing device comprising a photosensitive cathode and a collector anode, the method which comprises the steps of producing an electron image representative of a light image projected on said photosensitive cathode, dispersing the electrons of said image in predetermined divergent paths to select electrons from a predetermined incremental area thereof and collecting said selected electrons from said predetermined incremental area.

14. In a picture analyzing device comprising a photosensitive cathode and a collector anode, the method which comprises the steps of producing an electron image representative of a light image projected on said photosensitive cathode, attracting electrons from all but one of the elemental areas of said electron image in opposite directions along divergent paths away from the direction of electron emission from said cathode and directing the electrons from said one elemental area of said electron image toward said anode.

12

15. In a picture analyzing device comprising a photosensitive cathode and a collector anode, the method which comprises the steps of producing an electron image representative of a light image projected on said photosensitive cathode, selecting electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern, deflecting said selected electrons toward said anode and deflecting substantially all other electrons in opposite directions away from said anode in divergent paths.

16. In a picture analyzing device comprising a photosensitive cathode and a collector anode, the method which comprises the steps of producing an electron image representative of a light image projected on said photosensitive cathode, selecting electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern, directing said selected electrons toward said anode, deflecting substantially all other electrons away from said anode to provide for a complete scansion of said electron image, and controlling the size of said successive elemental areas, thereby to control the effective size of the scanning aperture.

17. In a picture analyzing device comprising a photosensitive cathode and a collector anode, the method which comprises the steps of projecting a light image upon said photosensitive cathode, producing an electron image representative of said light image, selecting electrons from successive elemental areas of said electron image in accordance with a predetermined scanning pattern, deflecting substantially all other electrons away from the direction of electron emission from said cathode in predetermined divergent paths to provide for a complete scansion of said electron image, and directing said selected electrons out of the light projection path and toward said anode.

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