

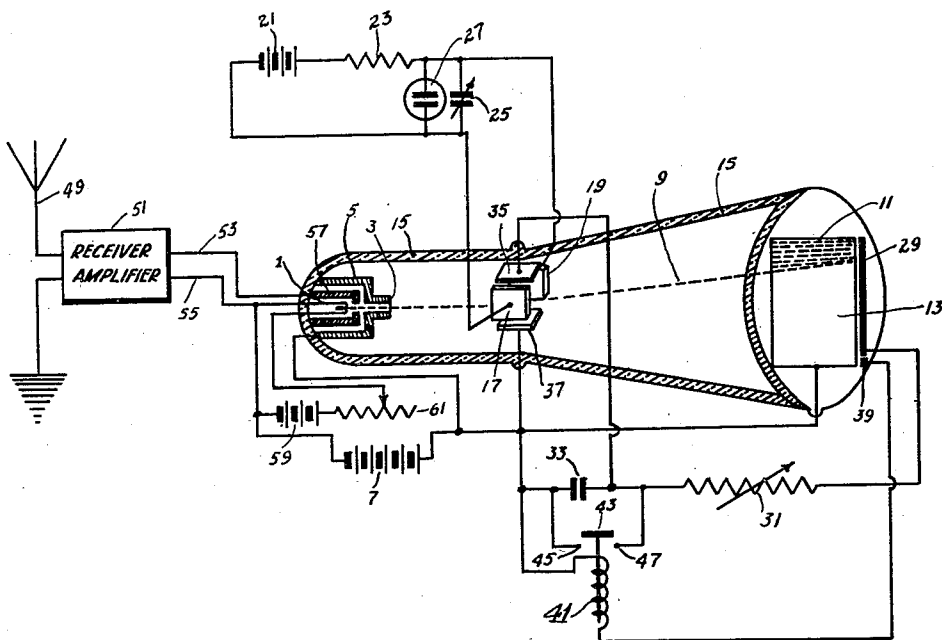
Oct. 9, 1934.

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1,976,400

CATHODE RAY SCANNING DEVICE

Filed May 21, 1931



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1,976,400

CATHODE RAY SCANNING DEVICE

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Application May 21, 1931, Serial No. 538,927
In Germany May 23, 1930

47 Claims. (Cl. 178—6)

The use of a Braun cathode ray tube at the receiving end of a television transmission system to act as a picture-point or unit distributor is known in the art. In most cases deflection of the cathode ray pencil occurring by lines is accomplished by supplying the four deflector electrodes with two suitable alternating current potentials produced either locally or transmitted from the transmitting end. Contradistinct to this mode of operation, in the invention hereinafter to be disclosed only one alternating current potential serves for coordinate control, or to be more precise, the potential which occasions movement of the cathode rays along a line, whereas the return of the ray pencil to the beginning of the next line and also return to the beginning of the first line after completion of the last line is insured by the cathode ray pencil itself.

With this end in view, auxiliary electrodes are disposed according to this invention upon the fluorescent screen or in the neighborhood thereof. The cathode ray pencil is caused to impinge upon these electrodes after the line motion has been terminated so that, in a manner which will hereinafter become apparent, the restoration or return of the cathode ray pencil to the beginning of the next line is occasioned.

One embodiment of the invention is shown by way of diagrammatic representation in the accompanying drawing.

The cathode ray pencil is furnished from the cathode 1, and it issues from the diaphragm 3 of the anode member 5 which is raised to a suitable potential by the potential source 7. When so directed the cathode ray is in the form of a parallel pencil or beam. In order to deflect the cathode ray pencil 9 in the direction of the lines 11 traced upon the fluorescent screen 13 forming the end wall, being adjacent to the end wall of the cathode ray tube 15, a pair of deflecting plates 17 and 19 are provided. Upon these plates, as will hereinafter appear, a convenient alternating current potential is applied.

Referring to the drawing the assumption has been made that this controlling alternating current potential is obtained from an intermittence circuit arrangement comprising a source of current 21, a resistance 23 and a condenser 25 with a parallel-connected gaseous-conduction lamp 27.

As will now appear, the cathode ray pencil 9 as accelerated by the anode 5 is caused to fall upon the fluorescent screen 13 and is caused to sweep the screen in a transverse direction by the potentials applied to plates 17 and 19. After

the termination of a line 11 of transverse scanning, the cathode ray pencil is caused to impinge briefly upon an electrode element 29. This electrode is connected by way of a variable resistance 31 with a condenser 33 whose potential, during each such contact, is increased by the same amount. In parallel relationship to this condenser element 33 the second pair of deflector plates 35 and 37, for controlling the vertical movement of the cathode ray, are connected. The potential difference upon the plates 35 and 37 which is suddenly raised after completion of each transverse scanning line of the cathode ray as influencing the charge on condenser 33 causes the next succeeding transverse scanning line to be shifted a suitable amount vertically with reference to the preceding line.

At the end of the last transverse scanning line 11, no further contact is made with electrode 29, and the cathode ray pencil, after having scanned the screen 13, impinges upon the electrode element 39.

This contacting of the ray 9 upon electrode 39 results in complete discharge of condenser 33, and, by virtue of the dependence of the potential of plates 35 and 37 for producing vertical deflection upon the charge on condenser 33, the discharging of condenser 33 returns the luminous spot produced upon screen 13 through impact of the cathode ray 15 to the beginning of the picture. By the embodiment illustrated on the drawing, the discharge of capacity 33 is effected by a relay 41 which is energized by the cathode ray pencil impinging upon the electrode 39 and which then causes the condenser to be short-circuited, for example, by closing armature 43 upon contacts 45, 47 which are connected through suitable conductors to either side of condenser 33.

In lieu of the relay 41 a glow discharge or gaseous-conduction tube connected in parallel relation to the condenser 33 may be used, in a manner similar to that assumed for the transverse control, which tube after attaining a certain potential difference is ignited after each passage or scanning of the picture surface whereby the starting value of the potential for the initial position of the cathode ray pencil is restored. With such a control for the vertical movement of the ray pencil 15, the electrode element 39 may be dispensed with, since the glow discharge lamp will flash through the accumulation of charges thereon.

As the invention has been explained above, no reference has been made to the production of any varying intensities of illumination which

would appear upon the fluorescent screen 13. However, in order to produce an electro-optical image of a subject located at a point of transmission, it is desirable to control the intensity of illumination produced by the cathode ray 9 as it bombards the fluorescent screen 13 so as to make each elemental area traced upon the screen correspond in intensity to a like elemental area of the subject, an image of which is being transmitted. As the invention has been illustrated herein, signals sent out from a point of transmission and corresponding to the varying intensities of light and shadow for successive elemental areas of the subject are received upon an antenna system 49, or, where desired, may be received over a wire line, and are then transferred to the receiver amplifier 51. Connected with the output of the receiver amplifier 51 are two conductors 53 and 55, of which conductor 53 connects with a grid element 57 contained within the tube 15 and the conductor 55 connects with the electrode element 1 serving as a source of cathode rays. The emitting electrode 1 is suitably heated by means of a current source 59, and this heating may be controlled where desired by means of a resistor element 61. As was taught by United States Patent to Nicolson #1,470,696, October 16, 1923, a grid element may be provided for controlling the intensity of the cathode rays as they sweep across the fluorescent screen, and the arrangement herein shown is illustrated as embodying the grid intensity control principle disclosed by Nicolson. It is, however, within the scope of my invention to use also other forms of control of intensity of the cathode ray, and these may be, for example, of the type disclosed by British Patent #27,570 of 1907, wherein the cathode ray stream is deflected across a diaphragm so as to cut off a portion of the stream and thus reduce the area effective upon the fluorescent screen, or, where desired, the intensity control may be in accordance with the disclosure in United States Patent #1,161,734, Nov. 23, 1915, wherein a method of controlling the intensity of light produced upon the fluorescent screen is in accordance with the time period during which the ray is permitted to impinge upon each successive elemental area of the fluorescent screen.

Several modifications of the control are, of course, possible, and since the invention is not directed to the intensity control per se, further reference to this form of arrangement is not believed to be necessary, although it will be appreciated that it is fully within the scope of the invention to resort to other types of intensity control systems where these are found suitable.

While the invention has been illustrated with an electrostatic means for deflecting the intensity controlled cathode ray stream, it is also within the scope of the invention to substitute for the electrostatic deflecting means electromagnetic deflecting means, or to substitute electromagnetic deflecting means for one of the electrostatic deflecting means and then retain one electrostatic deflecting means. In the event that the last named system is used, then it is preferable to retain electrostatic deflecting means for the fast motion of the cathode ray stream and to substitute electromagnetic means for deflecting the stream along its slower moving path.

Having now described my invention in one of its preferred embodiments, it is, of course, obvious that many modifications and changes may be made therein without departing from its spirit and scope, and I, therefore, believe myself to be

entitled to make and use any and all of these modifications such as suggest themselves to those skilled in the art to which the invention relates provided such changes and modifications fall fairly within the spirit and scope of the hereinafter appended claims, wherein I claim:

1. In a cathode ray system, means for developing a cathode ray and moving the said ray across a predetermined path, and means operable from said ray at predetermined points in the motion thereof for producing a motion thereof along a path transverse to said first named path.

2. A cathode ray device comprising a source for generating cathode rays, means for deflecting said generated rays in one plane, and means operable from the cathode ray pencil for producing a deflection thereof in a second plane.

3. A scanning system comprising a source for generating cathode rays, means for deflecting said rays back and forth across a screen in one path, and means controlled by the cathode ray in its movement along said path of deflection for causing a deflection thereof along a path bearing an angular relationship to said first named path of deflection for causing the first named deflection to produce jointly with said second deflection a series of substantially parallel paths across the screen.

4. A scanning system comprising a source for generating cathode rays, means for deflecting said rays in a horizontal direction, and means controlled by the cathode ray in its movement in said horizontal direction of deflection for causing a deflection thereof along a vertical path during the time period of the repeated horizontal deflections so as to cause said ray to trace a series of spaced horizontal traversals.

5. A scanning system comprising a source for generating cathode rays, an electrostatic field for deflecting said rays to trace a path across a recording screen in one direction, and means controlled by the cathode ray once during each movement thereof along said path of deflection for causing each successive deflection thereof along said first directional path to be spaced apart from the preceding path by a predetermined amount.

6. A scanning system comprising a source for generating cathode rays, an electrostatic field for deflecting said rays back and forth along a series of paths extending in a transverse direction to a plane of viewing, and means controlled by the cathode ray in its back and forth motion along said path for progressively deflecting the said ray at the completion of each first named path along a second series of paths extending transverse to said first paths, and upon completion of a predetermined number of changes of path along said second line of deflection returning the path of said first deflection to the line originally traced.

7. In a television system, a scanning device comprising a cathode ray tube having a source for generating cathode rays and a screen responsive to the action of said rays, means for deflecting said cathode rays along a path transverse of the screen in one direction, and means operable by said cathode ray at time periods when said cathode ray has been deflected to a maximum extent in said direction for moving the said ray vertically so as to trace each succeeding path with a predetermined spacing with respect to the preceding path.

8. A scanning device for television and the like comprising a cathode ray tube having a

source for generating cathode rays and a viewing screen responsive to said rays, means for sweeping said cathode rays back and forth across said screen in a first path, and means operable by said cathode ray at one extreme position in the motion thereof for producing a progressive change in the position at which the said ray sweeps said screen for causing the said screen to be subjected to said rays along a series of paths parallel to each other and spaced apart from each other with a predetermined spacing.

9. A television system comprising a cathode ray receiving device, a source of cathode rays, a fluorescent screen upon which said cathode rays are adapted to impinge so as to produce luminous effects thereon, means for deflecting said cathode rays along a path extending across said screen in one direction, and means associated with said screen and responsive to the cathode ray stream once during each period of deflection along one of said paths for producing a deflection in a second direction bearing an angular relationship to said first named direction for causing successive paths of deflection along said first direction to be spaced apart from and adjacent to each preceding path for a predetermined number of deflections along said first path.

10. A television receiving device comprising a cathode ray tube having a source for generating cathode rays and a fluorescent screen adapted to become luminescent upon bombardment of said cathode rays, an electrode adjacent said fluorescent screen and extending along one edge thereof, means for deflecting said cathode rays transversely of said fluorescent screen in one path and causing said rays to impinge upon said electrode at the end of each transverse motion thereof, and means operable at time periods when said cathode ray impinges upon said electrode for moving said ray in a direction substantially perpendicular to said first named path of deflection for causing each successive traversal of said cathode ray to trace a path substantially parallel and spaced apart from said first named path.

11. In a television system comprising a cathode ray receiving device having a source for producing a pencil of cathode rays, a fluorescent screen upon which said cathode rays are adapted to impinge so as to produce luminous effects thereon, means for causing said cathode rays to trace a series of points back and forth across said screen, means associated with said screen and responsive to the cathode ray stream once during each back and forth motion thereof for deflecting the said ray and causing the succeeding series of points to be displaced in a direction substantially perpendicular to the path of said first named series of points by a predetermined amount, and means operable from said ray at time periods when a predetermined number of deflections perpendicular to the first series of points have been produced for causing a complete recurrence of all of said series of points in identical order.

12. A television receiving device comprising a cathode ray tube having a source for generating cathode rays, a fluorescent screen adapted to become luminescent upon bombardment of said cathode rays, an electrode adjacent said fluorescent screen and extending along one edge thereof, means for deflecting said cathode rays transversely of said fluorescent screen along a predetermined path in one direction and causing said rays to impinge upon said electrode at the end of each transverse motion thereof, a capacity means

having the charge thereon progressively increased at each time period when said cathode ray impinges upon said electrode for moving said ray in a direction substantially perpendicular to said first named path of deflection for causing each successive traversal of said cathode ray to trace a path substantially parallel and spaced apart from said first named path, and means operable from said ray upon a completion of a predetermined number of traversals of said screen in said first direction for discharging said capacity and causing a complete and similar repetition of each of said paths of deflection.

13. In an electro-optical image producing system, a source of cathode rays, a screen adapted to become luminescent upon bombardment of said cathode rays, means for moving said cathode rays across said screen in one direction, an electrode element arranged adjacent said screen and adapted to be subjected to said cathode rays upon each motion of the cathode ray across said screen, and means operable from said electrode as controlled by the impact of said cathode ray stream thereon for causing a progressive movement of said cathode ray across said screen in a direction substantially transverse to said first named direction of motion of said ray.

14. In an electro-optical image producing system having a source of cathode rays, a screen adapted to become luminescent upon bombardment of said cathode rays, means for moving said cathode rays across said screen in one direction, an electrode element arranged adjacent said screen and adapted to be subjected to said cathode rays upon each motion of the cathode ray across said screen, means operable from said electrode as controlled by the impact of said cathode ray stream thereon for causing a progressive movement of said cathode ray across said screen in a direction substantially transverse to said first named direction of motion of said ray, and means operable from said ray upon completion of a predetermined series of said progressive deflections for producing a deflection in the direction opposite said deflection produced by said ray and of an amount equal to the sum of all of said progressive deflections so as to permit a complete repetition of all of said deflections in a like order of recurrence.

15. In a television viewing device, a source of cathode rays, a fluorescent screen adapted to become luminescent upon bombardment thereof by said cathode rays, means for deflecting said rays in their path of motion toward said screen so as to cause said rays to trace a path transverse to said screen in one direction, an electrode extending along the edge of said screen perpendicular to the path traced across said screen by said rays and adapted to be influenced by said ray once during each transverse motion of said ray across said screen, means operable from said electrode as influenced by the said cathode ray impinging thereon for deflecting said ray in a direction substantially perpendicular to said first named deflection path for causing said cathode ray to sweep across said screen along successive parallel paths, and a second electrode adjacent said screen and adapted to be influenced by said cathode ray during a single motion only thereof across said screen for changing the deflection path of said ray in said second direction from a maximum to a minimum upon the completion of a series of traversals of said ray across said screen in said first named direction.

16. The method of television scanning with a

cathode ray device which comprises developing a cathode ray, moving the said ray across a predetermined path, and producing from the cathode ray at predetermined points in the motion thereof along said path a motion thereof
5 along a second path transverse to said first named path.

17. The method of television scanning comprising generating cathode rays, deflecting said
10 generated rays in one direction, and producing from the cathode ray pencil a deflection thereof in a transverse direction at predetermined points in the deflection in said first direction.

18. A cathode ray device comprising a source
15 for generating a cathode ray pencil, means for deflecting the generated cathode ray pencil in one plane, and means operative from the cathode ray pencil for producing a progressive deflection of the cathode ray pencil along a series
20 of planes spaced apart from and parallel to said first plane of deflection.

19. In a cathode ray system, means for developing a cathode ray, means for moving the said ray across a predetermined path, means operative
25 from said cathode ray at predetermined points in the motion thereof for producing a motion thereof along a path transverse to said first named path, and means operable during the motion of the cathode ray across the first predetermined path for varying the effective intensity of the developed ray.
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20. A cathode ray device comprising a source for generating cathode rays, means for projecting the generated rays toward a fluorescent screen
35 formed as a part of the cathode ray device, means for deflecting the generated cathode rays in one plane, means operative from the cathode ray for producing a deflection thereof in a second plane, and means operable during the motion of the
40 cathode ray in the first plane for varying the effective intensity of the ray impinging upon the fluorescent screen.

21. A scanning system comprising a source for generating cathode rays, means for deflecting the
45 cathode rays along a predetermined path back and forth across a fluorescent screen in such manner that the rate of traversal in one direction is slow and in the other direction rapid, means controlled by the cathode ray during its deflection
50 back and forth across the screen for causing a deflection thereof in a direction parallel to and spaced apart from the preceding path so as to produce jointly with the first deflection a series of parallel paths across the screen, and means
55 operable during the motion of said cathode ray across the first predetermined path for varying the effective intensity of the developed ray impinging upon the screen.

22. A scanning system comprising a source for generating cathode rays, means for deflecting the
60 generated rays in a horizontal direction, means controlled by the cathode ray in its movement along the horizontal path of deflection for causing a deflection thereof along a vertical path during the time period of the repeated horizontal
65 deflections so as to cause the generated ray to trace a series of spaced horizontal paths, and means operable during the motion of the ray across each horizontal path for varying the intensity of the developed ray.
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23. A scanning system comprising a source for generating a cathode ray pencil, an electrostatic field for deflecting the cathode ray pencil to trace a path across a recording screen in one
75 direction, means controlled by the cathode ray

once during each movement thereof along the path of deflection for causing each successive deflection thereof along the first directional path to be spaced apart from the preceding path by a predetermined amount, and means for controlling the effective intensity of the generated
80 cathode ray pencil upon the screen during the periods of traversal.

24. In a television system, a scanning device comprising a cathode ray tube having a source
85 for generating a cathode ray pencil and a screen responsive to the action of the cathode ray pencil, means for deflecting the cathode ray pencil along a path transverse to the screen in one direction, means operative by the cathode ray
90 pencil at time periods when the cathode ray has been deflected to a maximum extent in one direction for moving the cathode ray in a direction transverse to the first direction of motion so as to trace each succeeding path of deflection with
95 a predetermined spacing with respect to the preceding path, and means to vary the observable intensity of the response produced upon the screen by the traversal of the cathode ray stream across the screen.
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25. In a television system comprising a cathode ray receiving device having a source for producing a pencil of cathode rays, a fluorescent screen upon which the cathode rays are adapted to impinge so as to produce luminous effects
105 thereon, means for causing the cathode rays to trace a series of points back and forth across the screen, means associated with the screen and responsive to the cathode ray stream once during each back and forth motion thereof for deflecting the ray and causing the succeeding series of points to be displaced in a direction substantially perpendicular to the path of the first named series of points by a predetermined amount, means operative from the ray at time
115 periods when a predetermined number of deflections along the perpendicular path have been produced for causing a complete recurrence of all of the paths in identical order, and means operable to control the effective intensity of the response produced upon the fluorescent screen by the cathode rays during the back and forth motion thereof across the screen.
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26. A television receiving device comprising a cathode ray tube having a source for generating
125 cathode rays, a fluorescent screen adapted to become luminescent upon bombardment of the cathode rays, an electrode adjacent the fluorescent screen and extending along one edge thereof, means for deflecting the cathode rays transversely of the fluorescent screen along one predetermined path of deflection and to impinge upon the electrode at the end of each transverse motion thereof, a capacity means having the charge
135 thereon progressively increased at each time period when the cathode ray impinges upon the electrode for moving the ray in a direction substantially perpendicular to the first named path of deflection for causing each successive traversal of the cathode ray to trace a path substantially
140 parallel and spaced apart from the first named path, means operative from the ray upon a completion of a predetermined number of traversals of the screen in the first direction for discharging the capacity and causing a complete and similar repetition of each of the paths of deflection, and a controlling element within the tube for controlling the luminous response produced upon the fluorescent screen by the traversal of the cathode rays.
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27. In an electro-optical image producing system, a source of cathode rays, a screen adapted to become luminescent upon bombardment of the cathode rays, means for moving the cathode rays across the screen in one direction, an electrode element arranged adjacent the screen and adapted to be subjected to the cathode rays upon each motion of the cathode ray across the screen, means operative from the electrode as controlled by the impact of the cathode ray stream thereon for causing a progressive movement of the cathode ray across the screen in a direction substantially transverse to the first named direction of motion of the ray, and means operable during the motion of the cathode ray in the first direction for varying the luminous intensity observable from the bombardment of the rays.

28. In a television viewing device, a source of cathode rays, a fluorescent screen adapted to become luminescent upon bombardment thereof by the cathode rays, means for deflecting the rays in their path of motion toward the screen so as to cause the rays to trace a path transverse to the screen in one direction, an electrode extending along the edge of the screen perpendicular to the path traced across the screen by the rays and adapted to be influenced by the ray once during each transverse motion of the ray across the screen, means operative from the electrode as influenced by the cathode ray impinging thereon for deflecting the ray in a direction substantially perpendicular to the first named deflection path for causing the cathode ray to sweep across the screen along successive parallel paths, a second electrode adjacent the screen and adapted to be influenced by the cathode ray during a single motion only thereof across the screen for changing the deflection path of the ray in the second direction from a maximum to a minimum upon the completion of a series of traversals of the ray across the screen in the first named direction, and means for varying the intensity of the luminous effects produced by the bombardment of said cathode rays.

29. The method of controlling a cathode ray tube system which comprises developing a cathode ray, moving the developed ray to cause it to traverse a predetermined path, and producing from the ray at predetermined points in the motion thereof along the traversed path a motion along a path transverse to said first named path.

30. The method of operating a cathode ray device which comprises generating cathode rays, deflecting the generated rays in one plane, and producing from the cathode ray at one point in its deflection a second deflection along a path in a different direction from the first plane of deflection.

31. The method of scanning the screen of a cathode ray tube which comprises generating cathode rays, deflecting the generated rays back and forth across the screen along one predetermined path, and controlling by the cathode ray in its back and forth movement along the path of deflection a second deflection of the ray along a path bearing an angular relationship to the first path of deflection, so that the first deflection path produces jointly with the second deflection path a series of substantially parallel paths across the screen.

32. The method of scanning the screen of a cathode ray tube which comprises generating cathode rays, deflecting the generated rays back and forth across the screen along one predetermined path, controlling by the cathode ray in

its back and forth movement along the path of deflection a second deflection of the ray along a path bearing an angular relationship to the first path of deflection, so that the first deflection path produces jointly with the second deflection path a series of substantially parallel paths across the screen, and controlling the intensity of the cathode rays impinging upon the screen for varying the intensity of the luminous effects produced.

33. The method of controlling a cathode ray tube system which comprises developing a cathode ray, moving the developed ray to cause it to traverse a predetermined path in two directions wherein the motion in one direction is slow and in the other direction rapid, producing from the cathode ray at a predetermined point in the motion thereof along the traversed path a motion along a path transverse to the first path, and controlling the intensity of the cathode ray in its motion along the traversed paths to vary in proportion to the intensity controlling the luminous effects produced.

34. The method of scanning the fluorescent end wall of a cathode ray device which comprises generating a cathode ray stream, generating an electric field for deflecting the ray stream to trace a path across the screen in one direction, and controlling by the ray once during each movement thereof along the path of deflection a second deflection of the ray to produce a traversal path parallel to the first directional path and spaced apart therefrom by a predetermined separation.

35. The method of scanning the fluorescent end wall of a cathode ray device which comprises generating a cathode ray stream, generating an electric field for deflecting the ray stream to trace a path across the screen in one direction, controlling by the ray once during each movement thereof along the path of deflection a second deflection of the ray to produce a traversal path parallel to the first directional path and spaced apart therefrom by a predetermined separation, and controlling during the deflection along the first path a change in the intensity of the cathode rays to produce variations in the intensity of the luminous effects produced thereby.

36. The method of scanning a viewing screen with a cathode ray device for television and the like comprising generating cathode rays and projecting the generated rays toward a viewing screen responsive thereto, sweeping the generated cathode ray back and forth across the screen along a predetermined path, and producing by the cathode ray at the extreme position of the motion thereof in one direction a progressive change in the position at which the screen is sequentially subjected to the influence of the generated cathode ray so that the screen is traversed along a series of paths parallel to each other and spaced apart from each other with a predetermined spacing.

37. The method of controlling the position of electro-optical images in a cathode ray television system which comprises producing a pencil of cathode rays, projecting the rays upon the fluorescent screen of the system to produce luminous effects thereon, causing the cathode rays to trace a series of light points back and forth across the screen, deflecting the cathode ray and causing the succeeding series of light points to be displaced in a direction substantially perpendicular to the path of the first named series of light points by a predetermined amount in accordance with the response of the cathode ray stream upon the screen once during each back and forth motion

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thereof, and producing from the ray at time periods when a predetermined number of deflections along a perpendicular path have been produced a complete recurrence of all of the said paths in identical order.

38. The method of controlling in a cathode ray tube the points at which a cathode ray stream generated therein impinges upon a predetermined transverse section in the path of the generated ray which comprises deflecting the ray to cause a traversal thereby of the predetermined section and utilizing the cathode ray to cause successive traversals of the predetermined section to be spaced one from the other.

39. The method of controlling in a cathode ray tube the points at which a cathode ray stream generated therein impinges upon a predetermined transverse section in the path of the generated ray which comprises deflecting the ray to cause a traversal thereby of the predetermined section and utilizing the cathode ray to cause successive traversals of the predetermined section to be spaced apart from and parallel to each other.

40. The method of operating a cathode ray device which comprises generating a cathode ray pencil, normally causing the cathode ray pencil to be deflected in such manner as to travel back and forth across a pre-established path on a predetermined surface and spacing each successive path across the surface by the action of the ray in its previous sweep path across the surface.

41. The method of operating a cathode ray device which comprises generating a cathode ray pencil, normally causing the cathode ray pencil to be deflected in such manner as to travel back and forth across a pre-established path on a predetermined surface, spacing each successive path across the surface by the action of the ray in its previous sweep path across the surface and causing by the ray pencil a repetition of the entire series of back and forth traversals of the surface at predetermined periods.

42. In a cathode ray device, means for generating a cathode ray, a conducting surface upon which the generated ray is adapted to impinge, an electrode element adjacent the conducting surface, means to deflect the generated ray in such manner as to cause the ray to traverse the conducting surface and the adjacent electrode at a relatively slow traversal speed and then to traverse the same elements in reverse order at a relatively high speed, and means controlled by the electrode adjacent the conducting surface for controlling the position on the conducting surface at which each subsequent ray traversal takes place.

43. A scanning device comprising a cathode ray tube including means for generating therein a cathode ray stream, means to produce saw-tooth formation electrical impulses to deflect the cathode ray stream to cause normally a continual

traversal and re-traversal of a surface along a predetermined path by the ray and means provided by the cathode ray stream for producing saw-tooth formation electrical impulses to deflect at each traversal the cathode ray stream in a direction transverse to the first deflection.

44. In a cathode ray device, means for generating a cathode ray, a surface upon which the generated ray is adapted to impinge, an electrode element adjacent the surface, means to deflect the generated ray in such manner as to cause the ray to traverse the surface and the adjacent electrode along a predetermined path in one direction at a relatively slow traversal speed and then to traverse the same elements in reverse order at a relatively high speed, and means for producing from the impact of the cathode ray upon the electrode adjacent the surface a controlling voltage to control the location of each subsequent path of traversal of the surface by the cathode ray.

45. In a cathode ray device, means to develop a cathode ray, means to generate saw-tooth formation electrical impulses for moving the ray in one plane, and means controlled by the generated cathode ray for generating saw-tooth formation electrical impulses for moving the ray in a second plane.

46. In a television system, a scanning device comprising a cathode ray tube having a source for generating a cathode ray pencil and a screen responsive to the action of the cathode ray pencil, means for deflecting the cathode ray pencil along a path transverse to the screen in one direction, means operative by the cathode ray pencil at time periods when the cathode ray has been deflected to a maximum extent in one direction for moving the cathode ray in a direction transverse to the first direction of motion so as to trace each succeeding path of deflection with a predetermined spacing with respect to the preceding path.

47. In a cathode ray device having means to generate a cathode ray stream, means for causing the cathode ray stream to traverse a path back and forth across a predetermined surface in the path of the generated cathode ray stream, an electrode positioned adjacent the surface across which the ray is moved, means controlled by the cathode ray stream impinging upon the electrode upon each traversal of the surface to cause the succeeding traversal of the surface by the cathode ray stream to be spaced from the preceding traversal, a second electrode adjacent the surface and also adjacent the first electrode, and means operative at time periods during which the cathode ray stream impinges upon the second electrode to cause a repetition of the preceding series of spaced traversal paths of the surface by the cathode ray stream.

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