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TELEVISION RECEIVER

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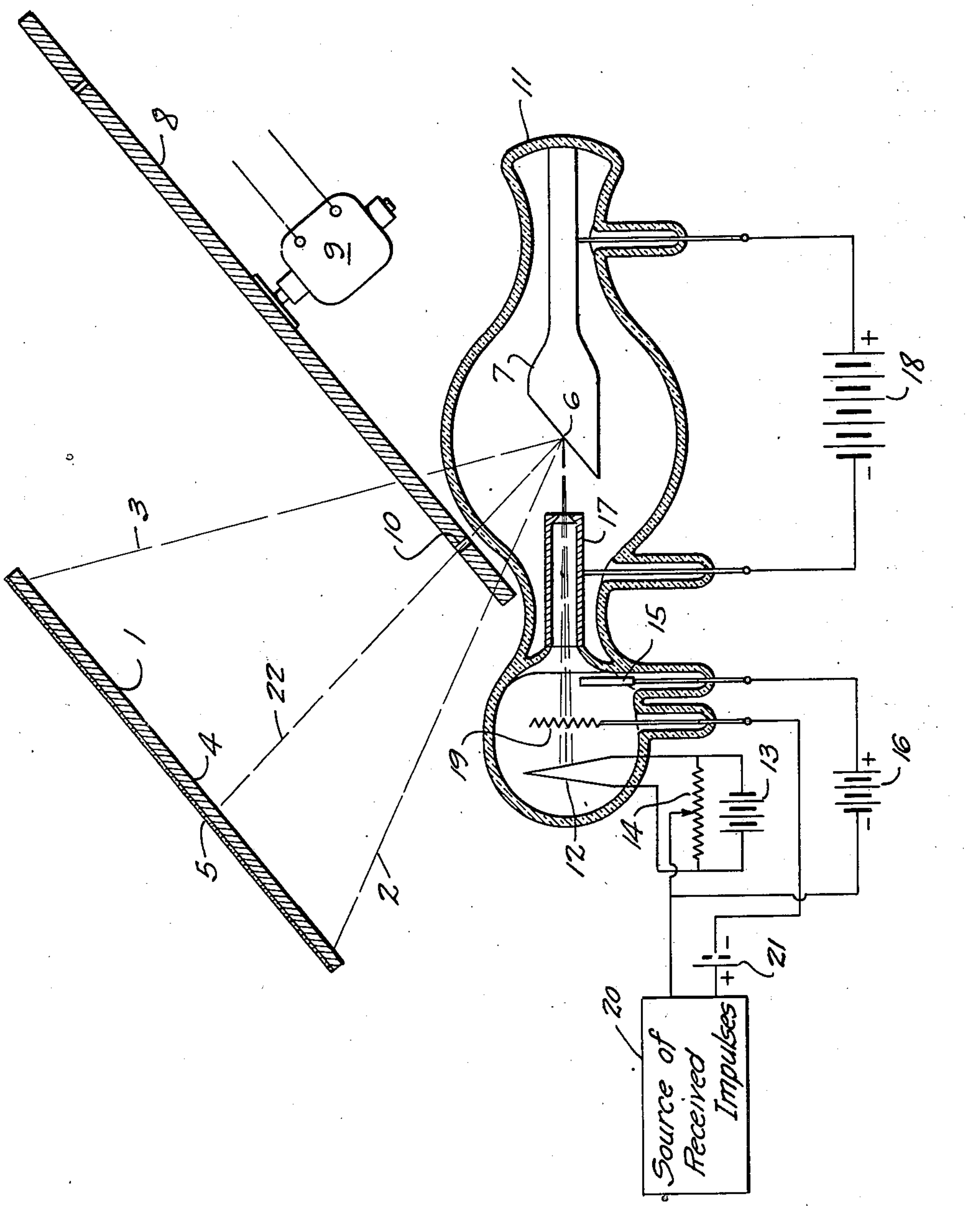

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TELEVISION RECEIVER

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3 Claims. (Cl. 250—35)

This invention relates to television, and more particularly to a receiving system for television.

Such systems usually employ a source of light the intensity of which varies with the received impulses, and which is caused to traverse or "scan" a screen, such as ground glass. The complete scanning to produce a complete image by variable illumination of the screen must be rapid enough to be within the period of the persistence of vision. Ordinarily, for this purpose, as many as ten to twenty complete images are produced in each second of time, for this purpose, corresponding to hundreds of thousands of pulsations per second.

The scanning can be produced in any of a number of ways; as for example, a scanning disc rotated at a speed synchronous with the light variations, in which disc there are a number of apertures arranged in a spiral. As the light shines through one aperture, the movement of the disc causes this light to traverse the screen, the "line" so produced having linear variations in light intensity. After this "line" is produced, the next aperture is immediately active to trace an adjacent line, and this is repeated so that for one complete revolution of the disc, there are produced as many lines of varying illumination as there are apertures in the disc. The height of the image is the radial distance from the outermost aperture on the spiral to the innermost aperture. Succeeding rotations produce succeeding complete linear scannings.

Since such scanning schemes or their equivalents are well-known, further description thereof is unnecessary.

In the use of ordinary light, it has been common to use a neon globe, which apparently had the advantage of being very quickly variable as regards light emission to comply with the received impulses. However, the degree of illumination has never been entirely satisfactory; inasmuch as a very high degree of intensity is needed to utilize the effect of the persistence of vision. This necessitated the use of a quite small screen to produce a sufficiently brilliant image. Furthermore, the response to these impulses is not exactly instantaneous; and finally, even if the image is produced as often as ten or more times per second, objectionable unsteadiness and flicker are still noticeable.

It is one of the objects of this invention to provide a television receiver that obviates these disadvantages. In this way it is possible to use a much larger screen, if desired, that can be simultaneously viewed by a large number of people.

It is another object of my invention to make it possible to illuminate each spot of the screen in such a way that its illumination is not only intense, but is caused to persist, so as to produce a flickerless image.

These results are accomplished by using, in place of a light source, a source of radiations of extremely short wave length, such as X-rays. These radiations in turn are converted into light rays, as by a fluorescent screen. This screen remains illuminated for a period sufficient to bridge the period of the persistence of vision. It is also intensely illuminable by producing a high intensity of radiations. The intensity of these radiations, furthermore, is instantaneously controllable in accordance with the received impulses, and accordingly more faithful reception is produced.

It is another object of this invention to make it possible to control a source of high frequency invisible radiations in accordance with the rapidly varying received impulses.

It is another object of this invention to obviate the necessity of using a very intense light source, and yet obtain an intensely illuminated screen, capable of affecting the eye to such an extent as to utilize to a high degree the effect of the persistence of vision.

Referring to the drawing:

The single figure is a diagram of one form of the invention.

In this figure, the screen 1 upon which images are visible is arranged in the path of high frequency radiations, such as a beam defined by the dotted lines 2 and 3. In this case the beam 2—3 is produced by short wave radiations, of the order of X-ray radiations, of intense penetrating power, in a manner to be hereinafter described. The screen 1 is made up of a backing or support 4, such as cardboard or thin metal that is pervious to the rays, and a layer 5 of fluorescent material. This layer 5 is arranged to be visible. The fluorescence or phosphorescence can be obtained by well-known means such as solutions of barium platinocyanide or calcium tungstate, applied as a paint to the screen.

The X-ray emanations preferably are arranged to radiate from a point source 6 on an X-ray target or anode 7. By providing a point source, the radiations can be passed directly to the screen without the need of any optical lens systems. The beam 2—3 is a cone. Interposed between this source and screen 1, is a scanning device, such as a scanning disc 8 rotated by a motor 9. This motor is operated in synchronism with the received television impulses so that the disc 8 can produce a scanning effect in proper relation to these impulses. Since beam 2—3 is a cone, the disc 8 traversing the beam controls the scanning of elemental areas of screen 1 in substantial exact accordance with the area of the beam where disc 8 intercepts it, without the need of lenses.

The disc 8 can be provided with a series of apertures, one of which is shown at 10, arranged in a spiral around the axis of the disc. The angular spacing of these apertures corresponds to the height of the image perpendicular to the plane of the drawing. In this way each aperture 10 sweeps across the field of screen 1 and produces a "line" transverse to the screen; in this instance, in a plane perpendicular to the drawing. Thus a "line" is in this way being scanned by the thin pencil of rays 22. The disc 8 can be rotated at the usual rate, that is from about ten to twenty times per second. Each rotation corresponds to a complete image scanning. Disc 8 is made from sufficiently thick metal to be impervious to the X-rays except at the apertures 10. It is, of course, also understood that the beam 2—3 is invisible but serves to excite the fluorescent layer 5 to intense luminosity wherever the beam strikes it through one of the apertures 10. The phosphorescence produced by the striking of the X-rays on the layer 5 persists for an appreciable period, and accordingly the images produced in succession on screen 1 are made up of lines of light that do not immediately disappear when the X-ray beam leaves this line. Of course, appropriate impervious shields are provided to confine the activity of source 6 to the region required.

By making the source 6 sufficiently intense, screen 1 can be moved quite far away from the source 6, to produce a large image that can be viewed by a large number of people simultaneously. This is especially useful in theatres or auditoriums. The area of the image thus formed increases as the square of the distance of the screen from source 6.

The intensity of the X-ray emanations can be varied in a number of ways to comply with the received impulses. A hot filamentary cathode 12 can be used, and electrons therefrom can reach the target 7, as in the conventional Coolidge tube. The hardness can be varied as by the aid of a control electrode 19 interposed in the electron path, the potential of which electrode with respect to the filament 12 can be varied directly in accordance with the received impulses. In this case, however, I have shown a so-called Lillienfeld type of X-ray tube, utilizing several additional electrodes, all of which are supported in an envelope 11. The X-rays are produced, as is well understood, by directing a stream of electrons travelling at a high rate on the sloping face of the target 7. This stream emanates from the cathode 12, heated as by current produced by a battery 13. A resistance 14 is bridged across the filament to act as a potentiometer. An auxiliary anode 15 is spaced from the filament 12 and is connected externally of the tube through a source of direct current potential 16. This source can be of the order of 1500 volts and serves to draw the electrons from the cathode 12 toward the target 7. The electrons are further accelerated by the aid of a supplemental tubular electrode 17 through which the electrons pass. The anode 7 is connected to electrode 17 through a high potential direct curent source such as 18. The potential of source 18 can be as high as 15,000 volts or more. In this way an intensely rapid moving stream of electrons is caused to strike the target 7.

The volume of electrons reaching target 7 is controlled by the control electrode 19, which can be in the form of a grid. By varying the relative potentials of the filament 12 and grid 19, as in ordinary three-electrode electronic emission devices, the intensity of electron flow can be made to vary instantaneously with the pulsations of electromotive force impressed across electrodes 12 and 19. Accordingly, these two electrodes 12 and 19 are connected to opposite sides of a source 20 of received impulses. By varying the tap on potentiometer 14 the grid 19 can have a bias with respect to cathode 12, such that when no impulses are received, the electron stream is just sufficient to produce a slight glow on screen 1. However, when the impulses are received the electrons are permitted to pass the control electrode 19 through the tubular electrode 17 and on to a point 6 on target 7, to produce intense luminosity.

If desired, a supplemental biasing means, such as battery 21 can be provided in the control electrode lead.

Electrodes 12, 19, and 15 virtually form a three electrode device for providing a reservoir of electrons for the cathode-anode arrangement 17—7. The control is intensely rapid and can faithfully follow the reception of extremely high frequency impulses by source 20. Only a low degree of amplification need be provided for by electrodes 12, 19 and 15. Furthermore, the hardness of the tube, being dependent upon the potential difference of source 18 is uniform.

By the aid of this control, the intensity of the X-ray beam 2—3 is made instantaneously responsive to the received impulses. When using the Coolidge type of tube, the hardness is varied. In either case, the intensity or hardness or both serve to determine the intensity of luminescence of screen 1. The glow of phosphorescence on layer 5 persists even after the X-rays leave any particular spot thereon, and therefore help to provide a continuous image, rather than an interrupted image as in the usual television receiver. It is with this in mind that I have used the term "persistence" in my claims. That is, the visible light persists after the X-rays have ceased to act on the screen.

I claim:

1. In a device of the character described, an evacuated vessel, an electron emitting cathode therein, an anode cooperating with said cathode for drawing electrons from the cathode, means forming a spaced pair of electrodes so arranged that the emitted electrons traverse the space between said spaced pair of electrodes to impinge upon one of them to cause an X-ray emission therefrom, means for impressing a potential difference between said spaced pair of electrodes so that the electrode upon which the electrons impinge forms an anti-cathode, a control electrode inside said vessel for varying the electron stream, and means for passing signaling impulses to the control electrode.

2. In a device of the character described, an evacuated vessel, an electron emitting cathode therein, an anode cooperating with said cathode for drawing electrons from the cathode, means forming a spaced pair of electrodes so arranged that the emitted electrons traverse the space between said spaced pair of electrodes to impinge upon one of them to cause an X-ray emission therefrom, means for impressing a uniform po-

tential difference between said spaced pair of electrodes so that the electrode upon which the electrons impinge forms an anticathode, a control electrode inside said vessel and adjacent the cathode for varying the electron stream, and means for impressing signaling impulses between the cathode and the control electrode.

3. In a device of the character described, an evacuated vessel, an electron emitting cathode therein, an anode cooperating with said cathode for drawing electrons from the cathode, means forming a spaced pair of electrodes so arranged that the emitted electrons traverse the space between said spaced pair of electrodes to impinge upon one of them to cause an X-ray emission therefrom, means for impressing a uniform potential difference between said spaced pair of electrodes so that the electrode upon which the electrons impinge forms an anticathode, a control electrode inside said vessel for varying the electron stream, and means for impressing signaling impulses between the cathode and the control electrode, one of the spaced pair of electrodes being near the anode and adapted to influence the electrons passing the anode.

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