

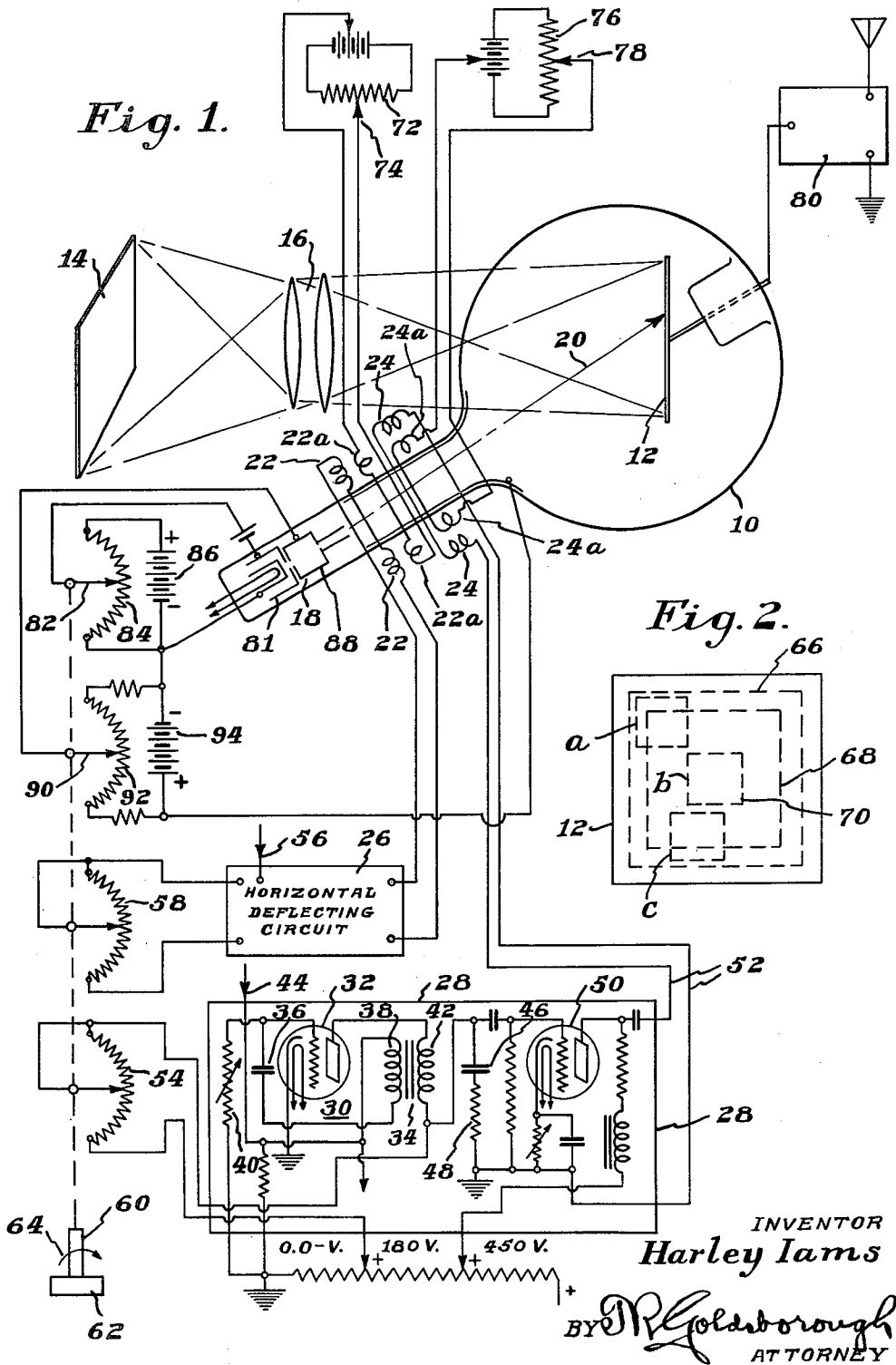
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TELEVISION TRANSMITTING APPARATUS

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TELEVISION TRANSMITTING APPARATUS

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My invention relates to improvements in television transmitting apparatus.

For the purpose of obtaining a close-up or a long-shot of a view in the various television transmitting apparatus proposed heretofore, it has been necessary either to change the lenses associated with the apparatus or to use two different machines, one for close-ups, the other for the long-shots.

One of the objects of my invention is to provide improved television transmitting apparatus embodying a cathode ray tube for developing the picture signals, and which can be easily controlled electrically, without the necessity of changing lenses, to obtain either a long-shot of a view or a close-up of a selected part of a view.

Other objects and advantages will hereinafter appear.

In accordance with my invention, an image of the view is focused on a given area of photosensitive screen structure forming part of an electron transmitting tube to develop an electrical image. The tube is provided with means for developing a ray of electrons which is directed at the screen structure and is deflected in different directions simultaneously to scan the latter, the respective angles or amplitudes of deflection being varied to cause the ray to scan only a selected part of the entire area of the screen structure containing the image of the entire view. In this way, the receiving apparatus is caused to reproduce an enlarged image of a particular selected part of the entire view at the transmitter.

My invention resides in the improved construction and method of operation of the character hereinafter described and claimed.

For the purpose of illustrating my invention, an embodiment thereof is shown in the drawing, wherein

Figure 1 is a diagrammatic view of television transmitting apparatus embodying my invention and operating in accordance therewith; and

Fig. 2 is an elevational view of the photosensitive screen structure of the transmitting tube in Figure 1.

With reference to Fig. 1, my improved system includes a cathode ray tube 10 provided with photosensitive screen structure 12 of the now well known mosaic type onto which an image of the view 14 for transmission is focused by a suitable lens system 16.

The tube is also provided with means designated generally by the reference numeral 18 for developing a ray 20 of electrons and directing the ray at the screen 12. For the purpose of causing

the ray 20 to scan the screen, it is deflected horizontally at a relatively high frequency by electromagnetic coils 22 and it is simultaneously deflected vertically at a relatively low frequency by electromagnetic coils 24. Circuits 26 and 28 operate to develop voltage waves of the required shape to cause saw-tooth current waves to pass through the coils 22 and 24, respectively.

The circuit 28 includes an oscillator circuit 30 comprising an electron tube 32 and a transformer 34 providing an inductive coupling between the plate and grid circuits of the tube. A blocking condenser 36 is connected as shown between the grid of the tube 32 and the grid winding 38 of the transformer. An adjustable resistance 40 provides a leakage for electrical charges stored in the condenser 36.

At the start of the operating cycle, the plate current increases, and the polarity of the grid winding 38 of the oscillation transformer is such that the grid is then driven positive. This action is effective to increase the plate current still further until a condition of saturation is reached, after which the plate current begins to decrease. At this point, the plate current decreases almost instantaneously to zero by reason of the fact that, at the instant the plate current begins to decrease, the polarity of the grid is reversed by the action of the transformer windings 38 and 42 with respect to each other. This drives the grid almost instantaneously to a negative potential far below that necessary for cut-off.

During the action just described, the charge stored in the condenser 36 places a bias on the grid of the tube 32 substantially more negative than that required for cut-off. The tube is therefore blocked against oscillation until the charge stored in the condenser leaks off by way of the resistance 40 to substantially the cut-off point of the tube 32, at which time an incoming synchronizing impulse at the "frame" frequency, applied to the circuit by a connection 44, is effective to counteract the bias potential on the grid of the tube to permit space current to flow. The cycle of operation is then repeated.

A saw-tooth voltage wave appears across a condenser 46 and an impulse voltage wave appears across a resistance 48. The voltage wave across the condenser 46 and the resistance 48 is amplified by an amplifier tube 50 and then applied to the coils 24 by the connections 52 to deflect the ray 20 vertically. The angle through which the ray is deflected can be varied by adjusting a variable resistor 54 connected as shown to change the plate voltage on the oscillator tube 32.

The circuit 26 is similar to the circuit 28, and is supplied with synchronizing signals by a connection 56. The angle through which the ray 20 is deflected horizontally can be varied by adjusting a resistor 58 connected in the circuit 26 the same as the resistor 54 is connected in the circuit 28. The adjustable contacts of the resistors 54 and 58 are fixed to a common shaft 60 for simultaneous movement by rotating a knob 62 fixed on the end of the shaft. The arrangement and connections are such that upon clockwise rotation of the shaft 60, as indicated by the arrow 64, the angle through which the ray 20 is deflected horizontally and the angle through which the ray is deflected vertically are increased to cause the ray to scan a greater part of the entire area of the screen 12 containing the image of the complete view. Upon rotation of the shaft 60 in the counter-clockwise direction, the angles through which the ray is deflected vertically and horizontally are decreased to cause the ray to scan a smaller part of the entire area of the screen 12 containing the image of the complete view. For example, assuming that the image of the complete view occupies the rectangular area 66 of the surface of the screen 12, the adjustment might be such that the ray 20 is caused to scan this area. Upon counter-clockwise rotation of the shaft 60 to a given position, the angles through which the ray is deflected horizontally and vertically might be decreased to cause the ray to scan the rectangular area 68, which is only a part of the entire area 66 containing the image of the complete view. Further rotation of the shaft 60 in the counter-clockwise direction might cause the ray to scan the rectangular area 70 which is smaller than the area 68. As the shaft 60 is rotated, the ratio of the angle of horizontal deflection of the ray to the angle of vertical deflection remains substantially constant. If the area 66 is square, therefore, the areas such as 68 and 70 will also be square.

For the purpose of causing the ray 20 to scan a particular area of the screen 12, auxiliary coils 22a are wound on the same core with the deflecting coils 22 and are connected as shown to a source of direct current comprising a resistance 72 provided with an adjustable contact 74. The arrangement and connections are such that upon movement of the contact 74 to the right, that part of the area 66 being scanned by the ray will be further to the right, while upon movement of this contact to the left that part of the area 66 being scanned will be further to the left.

Auxiliary coils 24a are wound on the same core with the deflecting coils 24, and are connected as shown to a source of direct current comprising a resistance 76 provided with an adjustable contact 78. The arrangement and connections are such that upon upward movement of the contact 78, that part of the area 66 being scanned will be further toward the top of the screen, while upon downward movement of this contact that part of the area 66 being scanned will be further toward the bottom of the screen.

In operation, as the ray 20 scans the area 66 of the screen 12, picture signals are developed and supplied to an amplifier and transmitter 80. If a close-up of a particular part of the view is desired, the shaft 60 is rotated in the counter-clockwise direction as explained to cause the ray, without change in either deflection-frequency,

to scan only a part of the area 66, such as the area 70. The contacts 72 and 78 are then adjusted to place the area 70 at the desired position at a or b or c, for example. The ray 20 then scans only that part of the image of the complete view which has been selected for enlargement, and the picture signals developed represent an enlargement of the selected part of the entire view since, at the receiver, there is no change in the total view-area nor in either deflection-frequency.

As the area scanned by the ray 20 is increased, it might be desirable to increase the intensity of the ray. For this purpose, the means 18 for developing the ray of electrons is provided with a grid 81 connected as shown to an adjustable contact 82 associated with a resistance 84 connected across a source of direct current 86. The contact 82 is fixed on the shaft 60, and the arrangement and connections are as shown so that upon clockwise rotation of the shaft to increase the area scanned the bias on the grid 81 becomes less negative, whereby the intensity of the ray 20 increases. Upon rotation of the shaft in the opposite direction to decrease the area scanned the bias on the grid 80 becomes more negative to decrease the intensity of the ray.

Also, as the shaft 60 is rotated in the counter-clockwise direction to cause the ray 20 to scan smaller parts of the area 66 containing the image of the complete view, it might be desirable to cause the ray to come to a sharper focus on the screen. For this purpose, the usual anode 88 of the ray-developing means 18 is connected to an adjustable contact 90 associated with a resistance 92 connected to a direct current supply 94. The contact 90 is fixed on the shaft 60, and the arrangement and connections are such that as the shaft is rotated in the counter-clockwise direction to cause the ray to scan smaller parts of the area 66, the potential on the anode 88 becomes correspondingly less positive to cause the ray to come to a sharper focus on the screen 12.

Instead of using the auxiliary coils 22a and 24a and the associated parts for selecting a particular part of the entire view for a close-up, the position of the tube 10 and the lens system 16 can be changed to accomplish the same purpose.

From the foregoing it will be seen that I have provided improved television transmitting apparatus and a method of operation thereof whereby a close-up of a selected part of the entire view can be easily obtained by a simple electrical adjustment of the transmitting apparatus, and without interrupting the operation thereof.

While but one embodiment of my invention has been disclosed, it will be understood that various modifications, within the conception of those skilled in the art, are possible without departing from the spirit of my invention or the scope of the appended claims.

I claim as my invention:

1. In television transmitting apparatus, a scanning device for developing picture signals comprising a tube provided with screen structure and with means for developing a cathode ray and directing the same at said structure, means for varying the intensity of the ray, means for deflecting the ray through a given angle in one direction and means for deflecting the ray simultaneously through a given angle in another direction to cause the ray to scan a given area of the surface of said screen structure, control means for varying the angle of ray-deflection by

said first-named ray-deflecting means, control means for varying the angle of ray-deflection by said second-named ray-deflecting means, and means common to said two control means and said means for varying the ray intensity to actuate the same simultaneously and in such sense to cause either simultaneous increase in both angles of ray-deflection and increase in the ray-intensity or simultaneous decrease in both angles of ray-deflection and decrease in the ray-intensity.

2. Picture transmission apparatus including a transmitter tube of the type having a light sensitive screen and a cathode ray source, an optical system for projecting an image of a view to be transmitted upon said screen, said image covering substantially the entire area of said screen for distant views, means for scanning either substantially the entire area of said image with the cathode ray or only a portion thereof at the will of the operator, and means for focusing the cathode ray to a smaller cross-sectional area at said screen in response to a decrease in the area of said image which is scanned.

3. In a picture transmitting system including a cathode ray tube having a photosensitive mosaic target electrode upon which an image is projected and wherein a cathode ray scanning beam is developed to scan the target, the method of scanning which comprises the steps of deflecting the developed cathode ray normally to scan substantially the complete target area in two mutu-

ally perpendicular directions, controlling simultaneously the amplitude of the deflection path in each of the mutually perpendicular directions to scan an area of reduced size on the target without altering the rate of scanning repetition, and shifting the centering of the developed cathode ray beam upon the target to confine the area of impact thereon to a single different area of a size equal to the reduced size area to select thereby for transmission only a fractional portion of the complete image projected upon the target.

4. The method of picture transmission in a system including a cathode ray tube having a photosensitive mosaic electrode and wherein a cathode ray is developed to scan said mosaic electrode, said method comprising the steps of projecting an image of a view to be transmitted upon a certain area of said mosaic electrode, said certain area being a major portion of the total area of said mosaic electrode, deflecting said ray normally to scan all of said certain area in two mutually perpendicular directions, reducing simultaneously the amplitude of the deflection path in each of said mutually perpendicular directions to scan an area of reduced size on said mosaic electrode without altering the rate of scanning repetition, said last area being included within said certain area, and shifting the centering of said ray to select thereby for transmission only a desired fractional portion of the complete image projected upon said mosaic electrode.

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