

March 3, 1942.

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2,275,026

TELEVISION SYSTEM

Filed Oct. 27, 1939

2 Sheets-Sheet 1

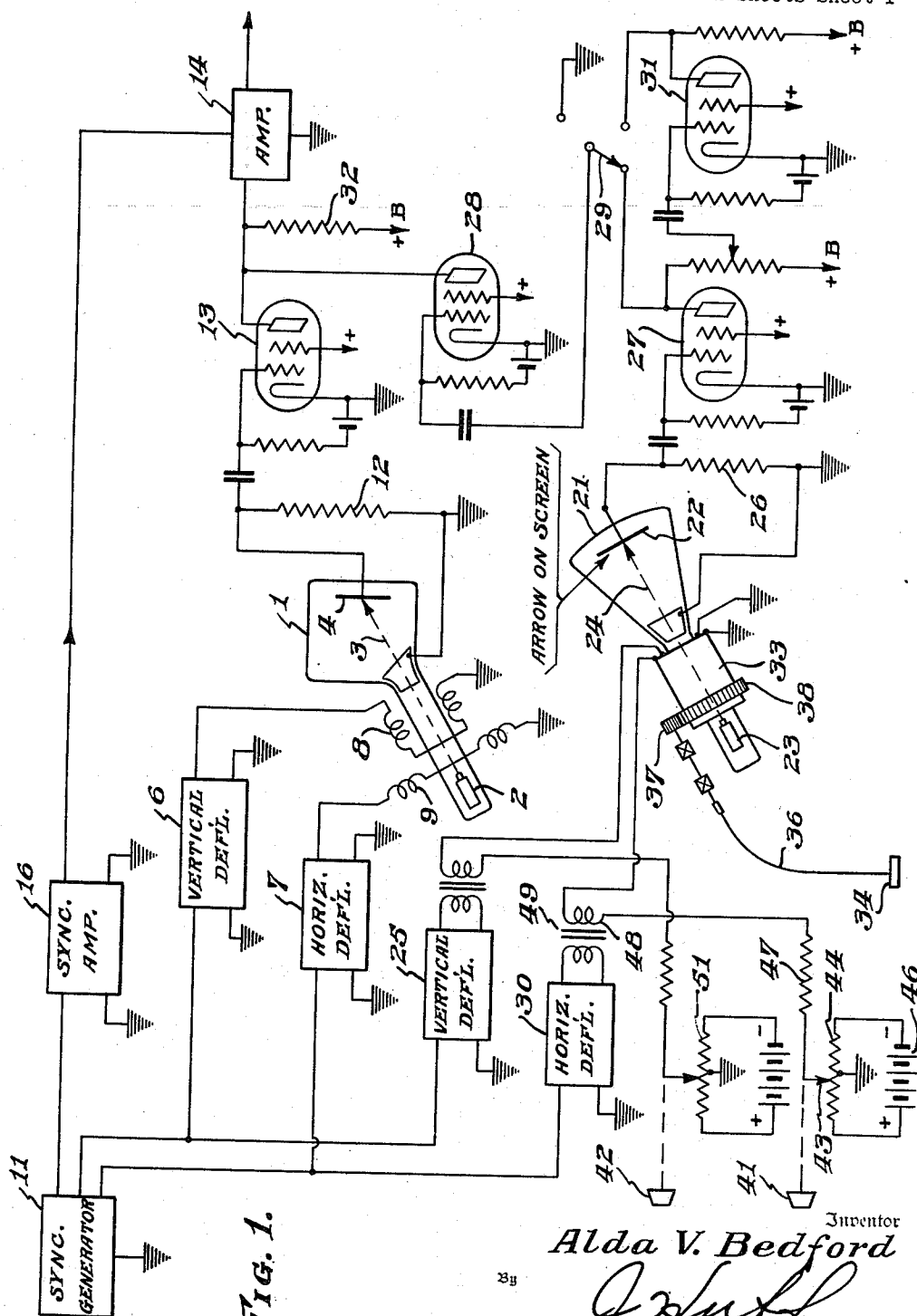


FIG. 1.

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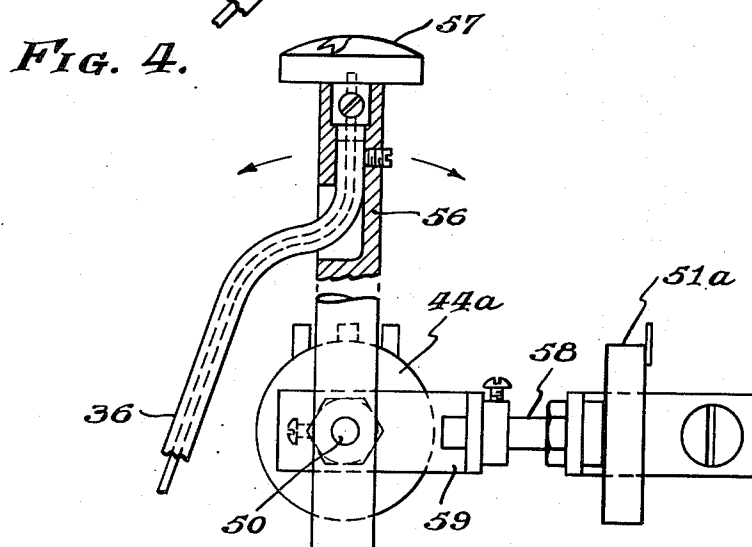
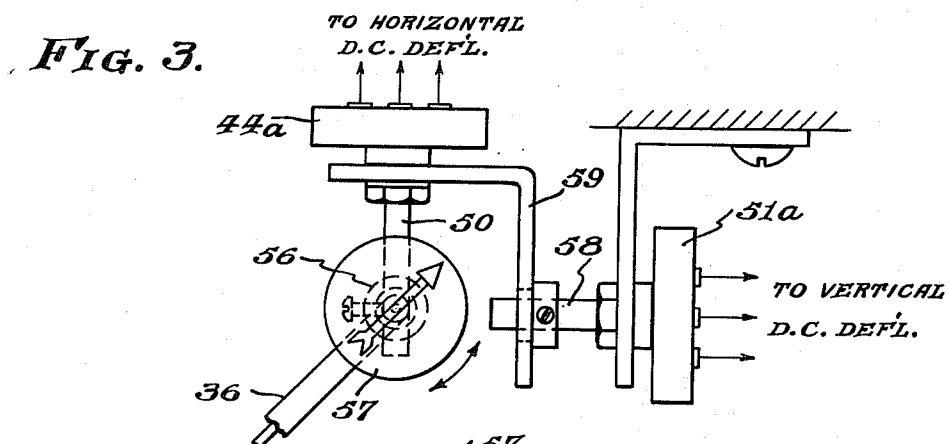
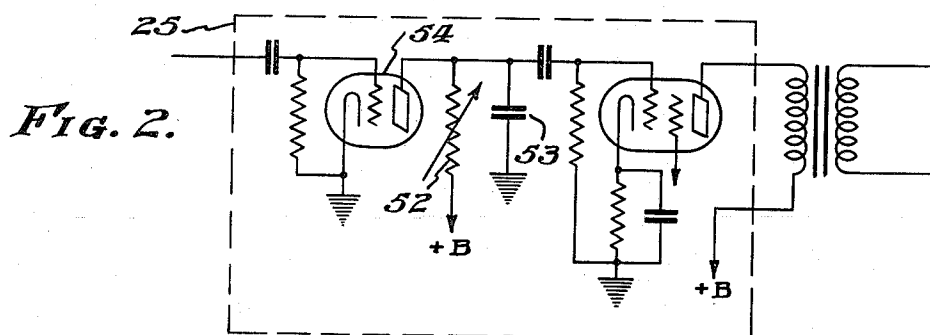
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,275,026

TELEVISION SYSTEM

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Radio Corporation of America, a corporation of
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Application October 27, 1939, Serial No. 301,556

6 Claims. (Cl. 178—7.2)

My invention relates to television systems and particularly to a system including means for pointing to or otherwise indicating or emphasizing selected portions of a television picture.

It is sometimes desirable to superimpose upon a transmitted picture an image of an arrow, an X, a star, an O, or some other indicating or emphasizing symbol in such a way that a particular portion of a transmitted picture may be called to the attention of a person viewing the picture at the receiver. The location of such a superimposed image with respect to the picture as a whole must, of course, be under the control of an operator at the television transmitter.

Accordingly, it is an object of my invention to provide an improved means for and method of indicating or emphasizing selected portions of a television picture.

A further object of my invention is to provide an improved television system of the above-described character which is simple in design and construction and which can readily be controlled by the operator.

In a preferred embodiment of the invention, the light image of the picture to be transmitted is converted into electrical picture signals in the usual way by means of a cathode ray transmitter tube such as the iconoscope. In order to superimpose an arrow, for example, upon this picture, signals representative of the arrow are generated by means of a second cathode ray tube of a type resembling the iconoscope but differing therefrom in that a plate or screen having the arrow formed thereon, as by engraving, is scanned by the cathode ray. The output signals of these two cathode ray tubes are added together and transmitted to the television receivers whereby, on the screen of the cathode ray receiving tube, the arrow appears superimposed on the received picture. By providing proper deflection control means associated with the cathode ray tube generating the signal representative of the arrow, the transmitter operator may position the arrow at will in the field of the picture.

The invention will be better understood from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a block and circuit diagram of a television transmitter embodying my invention,

Figure 2 is a circuit diagram of a deflecting circuit in the transmitter of Figure 1, and

Figures 3 and 4 are plan and side views, respectively, of a unicontrol means for the transmitter of Figure 1.

Referring to Fig. 1, the transmitter system preferably comprises a cathode ray transmitter tube 1, such as an iconoscope, having an electron gun 2 for developing a cathode ray indicated at 3 which is caused to scan a mosaic of light-sensitive elements forming the front surface of a screen structure 4.

Vertical and horizontal deflecting circuits 6 and 7, respectively, cause saw-tooth currents to flow through the deflecting coils 8 and 9 for deflecting the cathode ray in the usual way to scan the screen 4. The desired fixed time relation between horizontal and vertical deflection is maintained by means of a suitable synchronizing impulse generator 11.

The picture signal output of the tube 1 appears across an output resistor 12 and is supplied through an amplifier tube 13 to an amplifier 14 for further amplification and for mixing with the synchronizing signals which must be transmitted to the receiver. These synchronizing signals are supplied from the synchronizing impulse generator 11 through an amplifier 16 to a suitable stage in amplifier 14.

The portion of the system of Fig. 1 so far described is of the usual design. The specific design for both transmitter and receiver may be the same as described in my copending application Serial No. 222,081, filed July 10, 1938, and assigned to the Radio Corporation of America.

Referring now to the means for superimposing the arrow or other indicating symbol upon the picture, I preferably provide a cathode ray tube 21 having therein a plate or screen 22 upon which there is engraved or otherwise formed the indicating symbol. A cathode ray tube of this character is described and claimed in application Serial No. 106,301, filed October 19, 1936, in the name of Fritz Schroter and Max Knoll, and also in application Serial No. 137,399½, filed April 19, 1937, in the name of Max Knoll and Bernhard Spengler, both applications being assigned to the Radio Corporation of America.

The tube 21 includes an electron gun 23 for developing a cathode ray, indicated at 24, which is caused to scan the screen 22 by means of the vertical and horizontal deflecting circuits 25 and 30, respectively, and thereby produce signals representative of the indicating symbol since it has a different secondary emissive characteristic than the screen 22. These signals appear across an output resistor 26 and are supplied to an amplifier tube 27. They may be added to the picture signals in any suitable man-

ner but, preferably, are added by means of a circuit which permits reversing polarity of the signal so that the indicating symbol may be made either black or white on the received picture.

In the example illustrated, the output of tube 27 is supplied to an amplifier tube 28 either directly through a switch 29 or through a polarity reversing amplifier 31 and the switch 29. The output of tube 27 in either case is added to the output of the tube 13, the plate resistor 32 being made common to the two amplifier tubes for this purpose.

Referring now more particularly to the manner in which an operator moves the indicating symbol to the desired portion of a picture, the deflection of the cathode ray 24 preferably is accomplished by means of a pair of deflecting coils located in a deflecting yoke 33 which is rotatably mounted on the neck of the tube 21. This deflecting yoke may be constructed as described in Tolson Patent 2,167,379, issued July 25, 1939.

The arrow or other indicating symbol may be rotated at the will of the operator by means of a control knob 34 which, when rotated, rotates the deflecting yoke through a flexible shaft 36 and the gears 37 and 38.

The indicating symbol may be moved sideways or up and down on the picture at the will of the operator by means of knobs 41 and 42, respectively, which control the direct current component flowing through the deflecting coils of the yoke 33. In the example shown, the knob 41 controls the position of a pointer 43 on a potentiometer 44 which is grounded at its center point and connected across a battery 45. The D.-C. flow is through a resistor 47 and the secondary 48 of a transformer 49 supplying saw-tooth current to the horizontal deflecting coils. A similar circuit including a potentiometer 51 may be employed for controlling the D.-C. component flowing through the vertical deflecting coils. It should be understood that the horizontal and the vertical shift of the cathode ray may be accomplished, if preferred, by providing separate coils in the yoke 33 through which only the D.-C. components flow.

In the above-described system, the horizontal saw-tooth deflection for the cathode ray tube 1 preferably is at the same rate as the horizontal saw-tooth deflection for the cathode ray tube 21. Likewise, the vertical saw-tooth deflections of the two tubes preferably are at the same rate. All deflections are held in a fixed time relation by means of the impulse generator 11.

From the foregoing, it will be apparent that, by proper adjustment of the control knobs 34, 41 and 42, the operator may point to or otherwise indicate any desired portion or object in a picture appearing on the screen of a television receiver.

The size of the indicating symbol may be varied at the will of the operator by adjusting the amplitude of the saw-tooth waves supplied by the deflecting circuits 25 and 30. For example, referring to Fig. 2 which shows the vertical deflecting circuit 25 designed in accordance with conventional practice, the amplitude of the saw-tooth wave may be adjusted by changing the resistance of the resistor 52. It will be understood that the resistor 52 is the one through which a saw-tooth condenser 53 is gradually charged, the condenser being suddenly discharged through the tube 54.

In Figs. 3 and 4, there is shown a unicontrol structure which makes unnecessary the adjustment of three separate control knobs for pointing an arrow or the like to the desired area of a picture. In Figs. 1, 3 and 4, like parts are indicated by the same reference numerals.

Referring to Figs. 3 and 4, the three adjustments illustrated in Fig. 1 are made by moving a "stick" 56 and rotating a knob 57 mounted on the stick. Rotation of the knob 57 rotates the deflecting yoke 33 through the flexible shaft 36. Movement of the stick in the plane of the paper (Fig. 4) rotates the shaft 50 of the potentiometer 44a and moves the contact point 43 (Fig. 1) along the potentiometer resistor 44 (Fig. 1). Movement of the stick at right angles to the plane of the paper (Fig. 4) rotates the potentiometer shaft 58 through a bracket 59 and moves the contact point of the potentiometer 51a along the resistor 51 (Fig. 1).

If desired, the arrow or other indicating symbol which is engraved on the screen 22 of cathode ray tube 21 may be marked on the knob 57, as shown in Fig. 3, to aid the operator in moving the stick 56 and knob 57 to the desired location. It will be understood, however, that preferably the operator watches the picture on a monitor receiver or tube as he operates the knob and stick for moving the indicating symbol to the desired point in the picture.

I claim:

1. In a television system, means for converting a picture to be transmitted into electrical signals representative of said picture, a cathode ray tube comprising a screen having formed thereon in a fixed position an indicating symbol having a different secondary emission characteristic than said screen and comprising means for producing a cathode ray and directing it against said screen, deflecting means for causing said cathode ray to scan said screen whereby electrical signals representative of said symbol are produced, means for combining said picture and symbol signals whereby said symbol appears superimposed upon the received picture, and means for so controlling the position of said cathode ray laterally while it is scanning said screen that said symbol may be positioned on various desired areas of the received picture at the will of the operator.

2. The invention according to claim 1 wherein said last means comprises means for effecting relative rotation of said deflecting means and said cathode ray tube, means for shifting the center point of the horizontal deflection of said beam, and means for shifting the center point of the vertical deflection of said beam.

3. In a television system, means for converting a picture to be transmitted into electrical signals representative of said picture, a cathode ray tube comprising a screen having formed thereon an indicating symbol and comprising means for producing a cathode ray and directing it against said screen, deflecting means for causing said cathode ray to scan said screen whereby electrical signals representative of said symbol are produced, means for combining said picture and symbol signals whereby said symbol appears superimposed upon the received picture, means for so controlling the position of said cathode ray while it is scanning said screen that said symbol may be positioned on a desired area of the received picture at the will of the operator, said last-named means comprising means for rotating said deflecting means, means for shift-

ing the center point of the horizontal deflection of said beam, means for shifting the center point of the vertical deflection of said beam, and a unicontrol means for said rotating means and said two center-point shifting means.

4. In a television system, means for converting a picture to be transmitted into electrical signals representative of said picture, a cathode ray tube comprising a screen having formed thereon an indicating symbol and comprising means for producing a cathode ray and directing it against said screen, deflecting means for causing said cathode ray to scan said screen whereby electrical signals representative of said symbol are produced, said deflecting means including a pair of deflecting coils, means for combining said picture and symbol signals whereby said symbol appears superimposed upon the received picture, and means for so controlling the position of said cathode ray while it is scanning said screen that said symbol may be positioned on a desired area of the received picture at the will of the operator, said last means including means for causing a flow of direct current through each of said pairs of deflecting coils the magnitude and polarity of which may be controlled by the operator.

5. In a television system, means for converting a picture to be transmitted into electrical signals representative of said picture, a cathode ray tube comprising a screen having formed thereon an indicating symbol and comprising means for producing a cathode ray and directing it against said screen, deflecting means for causing said cathode ray to scan said screen whereby electrical signals representative of said symbol are produced, said deflecting means including a pair of deflecting coils, means for combining said picture and symbol signals whereby said symbol appears superimposed upon the received picture, and means for so controlling the position of said

cathode ray while it is scanning said screen that said symbol may be positioned on a desired area of the received picture at the will of the operator, said last means including means for rotating said deflecting coils about the axis of said cathode ray tube at the will of the operator.

6. In a television system, means for converting a picture to be transmitted into electrical signals representative of said picture, a cathode ray tube comprising a screen having formed thereon an indicating symbol and comprising means for producing a cathode ray and directing it against said screen, deflecting means for causing said cathode ray to scan said screen whereby electrical signals representative of said symbols are produced, means for combining said picture and symbol signals whereby said symbol appears superimposed upon the received picture, said deflecting means including a pair of deflecting coils, means for so controlling the position of said cathode ray while it is scanning said screen that said symbol may be positioned on a desired area of the received picture at the will of the operator, said last-named means comprising means for effecting relative rotation between said deflecting coils and said cathode ray tube, means for shifting the center point of the horizontal deflection of said beam, means for shifting the center point of the vertical deflection of said beam, and a unicontrol means for said rotating means and said two center-point shifting means, said unicontrol means comprising a stick having a rotatable handle or knob thereon, said handle being coupled to said deflecting coils for rotating them, and said stick being so coupled to said two center-point shifting means that when moved in one direction it actuates one of said center-point shifting means, and when moved in a different direction it actuates the other center-point shifting means.

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