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A. C. SCHROEDER
COLOR TELEVISION TUBE

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FIG. 1

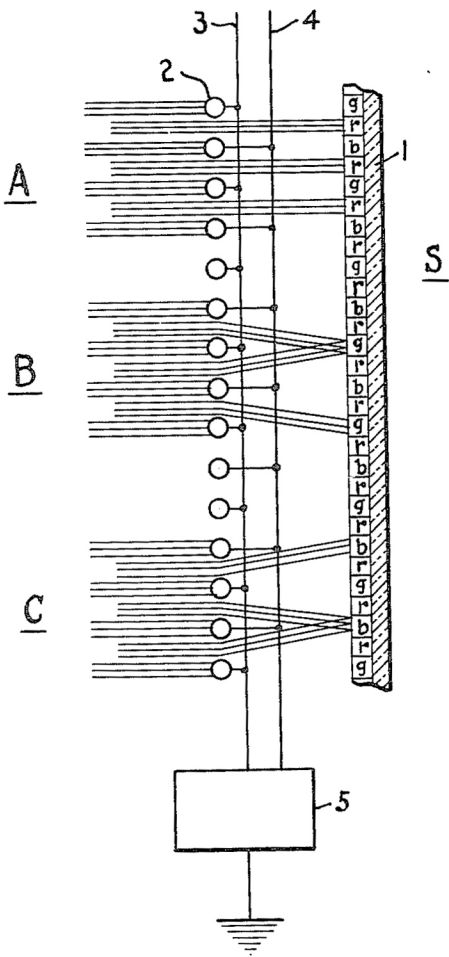
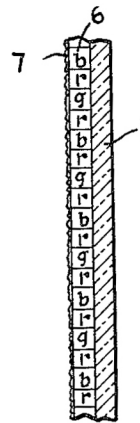


FIG. 2



INVENTOR
ALFRED C. SCHROEDER
BY
William A. Zalesak
ATTORNEY

UNITED STATES PATENT OFFICE

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COLOR TELEVISION TUBE

Alfred C. Schroeder, Feasterville, Pa., assignor to
Radio Corporation of America, a corporation of
Delaware

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This invention relates to improvements in tubes for television transmission and reception, such as the iconoscope and kinescope, respectively.

An object of the invention is to provide a tube that requires no moving parts for transmitting color signals or for converting such signals into corresponding colors.

Another object of the invention is to provide a screen for a cathode ray beam tube having scanning line strips corresponding to red, green and blue colors and having in front of the strips a plurality of conductors, the potentials of which are adapted to be varied for directing the electrons of the beam successively onto the "red," "green" and "blue" strips.

Other objects will appear in the following specification, reference being had to the drawings, in which:

Figure 1 is a diagrammatic illustration of a part of a screen and grid embodying the invention.

Figure 2 is a modified form of screen.

My improvement will be first described in connection with a pick-up transmitting tube, such as the well-known iconoscope.

In Fig. 1 of the drawing, the target or screen consists of a transparent body 1, such as the glass of the end of the evacuated tube envelope, or it may be a separate sheet of glass or mica inserted therein. Positioned in front of the screen is a grid comprising a plurality of wires 2, alternate ones of which are connected to conductors 3 and 4. These wires would be connected to the conductors at the sides of the screen, but in the diagrammatic illustration the connection has been shown between the wires and screen for convenience of illustration. On the base 1 is placed a plurality of color lines or sections extending from one side of the screen to the other. These color sections are the same size as the diameter of the wires, which is preferably the same size as the spacing between the wires. With this arrangement there is a color section or strip directly opposite each wire and each space. These color strips may consist of materials of different sensitivity to light, such that light from a red portion of an object being televised, for example, causes the most photoelectrons to be emitted, that from a green object less photoelectrons and that from a blue object still less photoelectrons. Alternatively, the material may have uniform sensitivity to light of the representative colors and the quantity of light varied by placing filters in front of the sections. The strips opposite the spaces between the wires are all adapted to produce the same color signal, red by way of ex-

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ample. The strips directly opposite the wires are alternately of different colors, say green and blue. The color arrangement, of course, may be made in any other order.

5 A unit 5, shown diagrammatically in the drawing, is adapted to place a plurality of potentials on the conductors 3 and 4. The changes in potential are produced in synchronism with the frame scanning frequency of the pick-up tube. The scanning means, both at the transmitter and the receiver, may be of the usual type and are not shown. During one frame scansion of the pick-up tube the conductors 3 and 4 will have the same potential and the beam electrons will pass through the spaces between the wires and strike the "red" sections *r* on the screen. This is illustrated at A of Fig. 1. These sections will therefore produce signals proportional to the red light of the image for one entire scansion, as the beam shifts its line scansion from top to bottom of the screen. The wires 2 will prevent the electrons from striking the green and blue color strips, because they are directly behind the wires. Thus, during this entire scansion, when the wires have the same potential, nothing but "red" signals will be transmitted.

15 In the next frame scansion, the condition is illustrated at B. During this scansion the potentials are placed on the conductors 3 and 4 such that 3 is positive with respect to 4. The field produced between the grid and screen thus deflects the electrons so that they strike the "green" sections only. This relation of potentials is maintained for one complete frame and therefore, as the beam scans the screen from top to bottom, "green" signals will be picked up for this entire scansion.

25 In the next scansion, potentials are placed on the conductors such that conductor 3 is negative to conductor 4. The result of this change of potentials upon the landing of electrons is illustrated at C in Fig. 1. The electrons passing between the wires are deflected so as to strike the "blue" sections only and this relation will be maintained throughout one complete scansion. Thus, "blue" signals will be picked up and transmitted.

30 Instead of making the sections of photo-sensitive material of different sensitivity to light of different colors, I may place filter strips 6 on the body 1 in any way, for example by putting dyes of appropriate color on the body, as indicated in Fig. 2. This may be done either on the outside or inside of the tube end 1, but I have illustrated it on the beam side. Then, one may deposit over

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the surface of the red, green and blue filter sections a photo-sensitive material 7 that is uniformly sensitive to color. The colors of the filters and also the grid wires and their connection to the unit 5 will be arranged in exactly the same way as illustrated in Fig. 1, but these have not been illustrated as the operation of Fig. 2 will be clear from the previous description of Fig. 1.

When my improved target and grid arrangement is to be used for converting picked up signals into pictures, the color sections of the screen S may consist of different phosphor materials, the r sections having a phosphor that emits red light under impact of electrons, the b sections a phosphor that emits blue light under similar impact and the g sections one that emits green light under the impact of electrons. Alternatively, the screen may be made as shown in Fig. 2, but for the receiving kinescope tube the mosaic 7 will be made of a phosphor material producing substantially white light and the strips in the column 6 would consist of red, green and blue filters, as already described.

In producing pictures, the received signals will be brought into a receiving set and will be, after amplification, applied to the grid in the gun of the kinescope in the usual fashion. The potentials between conductors 3 and 4 are varied in the same way as at the pick-up tube in synchronism therewith. Therefore, when a "red" signal is picked up at the transmitting tube and is received in the usual way, not shown, the potential on conductors 3 and 4 will be identical and the phosphor material struck by the electrons passing between the wires will emit its red color, which will be viewed through the body 1, say the end of the tube. When "green" signals are received, as at B, conductor 3 will have a greater potential than conductor 4 and for this frame scansion green signals only will be produced. During the next frame scansion, when "blue" signals are received, conductor 4 will have greater potential than conductor 3 and only the phosphor emitting blue light will be struck by the electrons passing between the wires. In this way, one viewing the image through the end of the tube 1 will view in succession red, green and blue images, which blend together to produce the colored picture.

While I have shown arrangements for producing three colors, the invention is not limited thereto, as different numbers of colors may be produced. For example, by merely alternating the potential of the conductors 3 and 4 and omitting the step in which they have equal potential, a two-color picture may be produced.

Various other modifications may be made without departing from the spirit of the invention.

I claim:

1. In pick-up tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires having maximum sensitivity to red light, the color strips opposite the wires of one grid having maximum sensitivity to green light and those opposite the wires of the other grid having maximum sensitivity to blue light and means for applying potentials to said grids for causing the beam electrons passing

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between the grid wires to land on the red, green and blue strips in succession.

2. In pick-up tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires having maximum sensitivity to light of one color, the color strips opposite the wires of one grid having maximum sensitivity to light of another color and those opposite the wires of the other grid having maximum sensitivity to light of a different color, and means for applying potentials to said grids for causing the beam electrons passing between the grid wires to land on the strips opposite the spaces, the wires of one grid and the wires of the second grid in succession.

3. In pick-up tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires responding to light of one color, the color strips opposite the wires of one grid responding to light of another color and those opposite the wires of the other grid responding to light of a different color, and means for applying potentials to said grids for causing the beam electrons passing between the grid wires to land on the strips opposite the spaces, the wires of one grid and the wires of the second grid in succession.

4. In pick-up tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, and a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires having maximum sensitivity to red light, the color strips opposite the wires of one grid having maximum sensitivity to green light and those opposite the wires of the other grid having maximum sensitivity to blue light.

5. In pick-up tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, and a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires having maximum sensitivity to light of one color, the color strips opposite the wires of one grid having maximum sensitivity to light of another color and those opposite the wires of the other grid having maximum sensitivity to light of a different color.

6. In pick-up tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid hav-

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ing parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, and a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires responding to light of one color, the color strips opposite the wires of one grid responding to light of another color and those opposite the wires of the other grid responding to light of a different color.

7. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires adapted to produce red light, the color strips opposite the wires of one grid adapted to produce green light and those opposite the wires of the other grid adapted to produce blue light, and means for applying potentials to said grids for causing the beam electrons passing between the grid wires to land on the red, green and blue strips in succession.

8. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, a plurality of color strips on said screen parallel to the wires of the grids, the color strips opposite the spaces between the wires adapted to produce light of one color, the color strips opposite the wires of one grid adapted to produce light of another color and those opposite the wires of the other grid adapted to produce light of a different color, and means for applying potentials to said grids for causing the beam electrons passing between the grid wires to land on the strips opposite the spaces, the wires of one grid and the wires of the second grid in succession.

9. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, a plurality of color filter strips on said screen parallel to the wires of the grids, the filter strips opposite the spaces between the wires adapted to produce light of one color, the filter strips opposite the wires of one grid adapted to produce light of another color and those opposite the wires of the other grid adapted to produce light of a different color, phosphor material on said filter strips and means for applying potentials to said grids for causing the beam electrons passing between the grid wires to land on the phosphor material on said filter strips opposite the spaces, the wires of one grid and the wires of the second grid in succession.

10. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined

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together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a phosphor screen in a plane parallel with and adjacent to said grids, and a plurality of color filter strips on said screen parallel to the wires of the grids, the filter strips opposite the spaces between the wires adapted to pass red light, the filter strips opposite the wires of one grid adapted to pass green light and those opposite the wires of the other grid adapted to pass blue light.

11. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a phosphor screen in a plane parallel with and adjacent to said grids, and a plurality of filter strips on said screen parallel to the wires of the grids, the filter strips opposite the spaces between the wires adapted to pass light of one color, the filter strips opposite the wires of one grid adapted to pass light of another color and those opposite the wires of the other grid adapted to pass light of a different color.

12. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a phosphor screen in a plane parallel with and adjacent to said grids, and a plurality of strips on said screen parallel to the wires of the grids adapted to produce colored light, the strips opposite the spaces between the wires adapted to produce red light, the strips opposite the wires of one grid adapted to produce green light and those opposite the wires of the other grid adapted to produce blue light.

13. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a phosphor screen in a plane parallel with and adjacent to said grids, and a plurality of strips on said screen parallel to the wires of the grids adapted to produce colored light, the strips opposite the spaces between the wires adapted to produce light of one color, the strips opposite the wires of one grid adapted to produce light of another color and those opposite the wires of the other grid adapted to produce light of a different color.

14. In television reproducing tubes having a gun for scanning a cathode ray beam over a screen, a grid having parallel wires joined together, another grid having parallel wires joined together, the wires of one grid alternating with those of the other with uniform spacing between the wires, a screen in a plane parallel with and adjacent to said grids, and a plurality of phosphor strips on said screen parallel to the wires of the grids, the strips opposite the spaces between the wires adapted to produce light of one color, the strips opposite the wires of one grid adapted to produce light of another color and those opposite the wires of the other grid adapted to produce light of a different color.

ALFRED C. SCHROEDER.