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SUMMARY OF RESEARCH PROGRESS MEETING OF SEPTEMBER 27, 1951

Sergey Shewchuck

November 14, 1951

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Berkeley, California

SUMMARY OF RESEARCH PROGRESS MEETING OF SEPTEMBER 27, 1951

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November 14, 1951
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I. Color Television Tube Ernest O. Lawrence

Color pictures require three times the definition of black and white; that is, each primary color must have three times the definition. The definition is set by the spot size, hence the spot must be three times as small. Limitations also are set by the image object distance, space charge, etc. The solution therefore is to focus the spot at the screen rather than at the electron gun. The silk screen process is used to deposit quite easily parallel strips 2 mils wide and 2 mils apart of red, green, and blue phosphors on the glass screen of the tube. The order of the color strips are red-red, green, blue-blue, green, red-red, green, etc. One half inch in front of this screen is a very fine wire grid with wires running parallel to the phosphor strips and spaced between each double strip of red and each double strip of blue. After the screen is aluminized a potential difference of 9000 v is applied between the grid and the screen. This then sets up an electrostatic field with curved electric lines of force between each individual wire and the screen. When the electrons come in from the gun with 3000 v they are deflected by these lines of force and, more or less, focused into a mean path between the fields of two adjacent wires through to the screen. See Fig. 1. When the potential between each wire and the screen is equal, the path taken by the electrons is equidistant between the wires and is focused at a green phosphor

strip. By varying the electric fields, or potential difference of alternate wires and the screen, the electron path is then shifted toward the wire with the weaker field and consequently focused at an adjoining phosphor strip of red or of blue, whichever the case may be. Hence, the shift in color is accomplished by rapidly changing the potential of the wires during the time of each scanning of the picture by means of alternating the wire connections of the grid and varying the potential difference of each alternate wire. This shift in color requires only two mils of shift in space, hence there is no serious problem of accurate register. For black and white pictures one needs only to disconnect the grid and to add its voltage to that of the gun, a total of 12000 v.

The optics of the tube are fairly simple. See Figure 2. The tube is easy to build and can be quite easily adapted to the existing types of television. Many applications for color television are possible, especially in the military field; as for example, emphasizing with color a special line or a particular feature of a graph or chart during demonstration, instruction, etc.

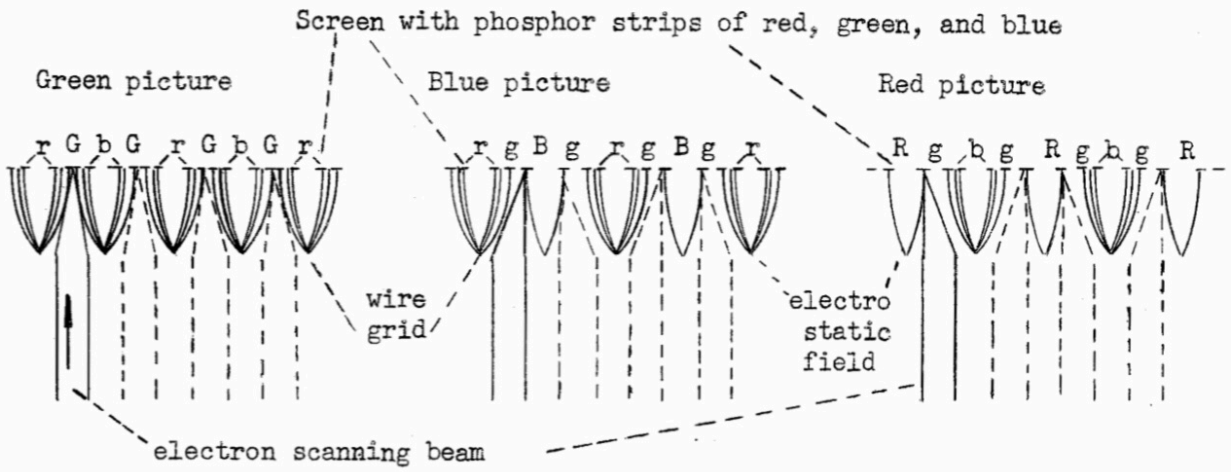
Screen with phosphor strips of red, green, and blue
Green picture
Blue picture
Red picture
r G b G r G b G r
r g B g r g B g r
R g b g R g b g R
wire grid
electro static field
electron scanning beam

Fig. 1

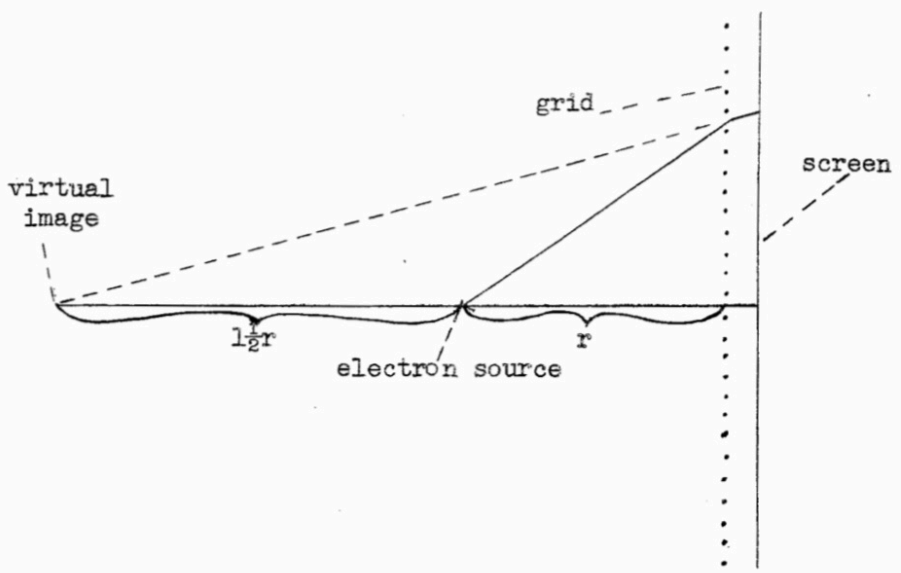
grid
screen
virtual image
½r
r
electron source

Fig. 2