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ANODE MODULATED TUBE

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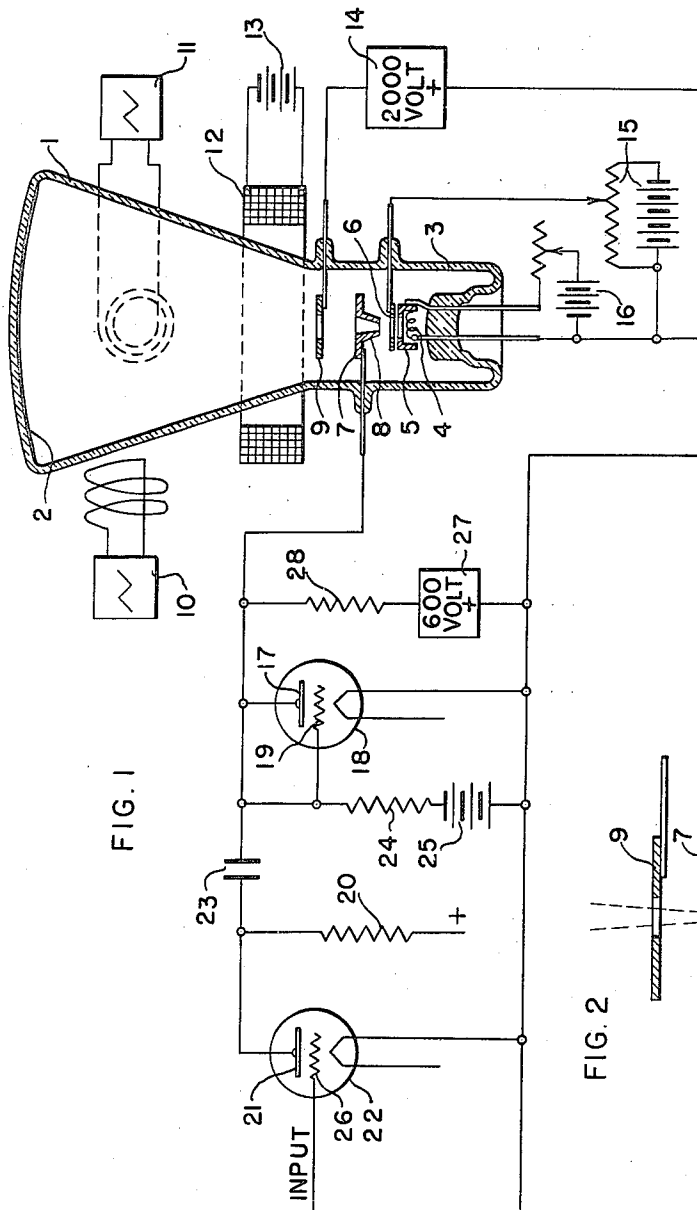


FIG. 1

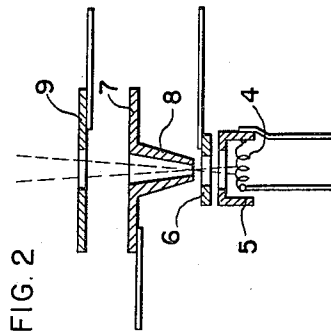


FIG. 2

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ANODE MODULATED TUBE

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2 Claims. (Cl. 178-7.5)

My invention relates to oscillograph tubes, and more particularly to such a tube that is operated with anode modulation.

Among the objects of my invention are: To provide a cathode ray tube and a circuit therefor for anode modulation of the tube; to provide a means and method of preventing signal impulses from affecting beam focus; to provide a means and method of maintaining scanning lines constant in width across light-dark boundaries of an image reproduced by scanning in a cathode ray tube; to prevent tailing out of scanning lines in a cathode ray tube; and to provide a television receiving tube and circuit therefor, with means for reducing the effect of signal on beam focus.

My invention possesses numerous other objects and features of advantage, some of which, together with the foregoing, will be set forth in the following description of specific apparatus embodying and utilizing my novel method. It is therefore to be understood that my method is applicable to other apparatus, and that I do not limit myself in any way to the apparatus of the present application, as various other apparatus embodiments may be adopted utilizing the method, within the scope of the appended claims.

Referring to the drawing:

Fig. 1 is a simplified diagram of a circuit used in conjunction with the cathode ray tube of my invention, the tube being shown in section.

Fig. 2 is an enlarged view of the electron gun system utilized in my invention.

My invention may be more fully understood by direct reference to the drawing, wherein a cathode ray tube having an envelope 1 is provided at the large end thereof with the customary fluorescent screen 2. At the other end of the envelope, in a smaller cylindrical portion 3 thereof, is positioned a cathode ray gun comprising a cathode 4 enclosed in a beam defining chamber 5, the cathode emission being controlled by an annular grid 6. Immediately over the opening in the annular grid 6 is positioned the usual anode 7 having a small conical hollow projection 8 extending toward the opening in grid 6.

Spaced from the anode, and between the screen and the anode, is an annular accelerating electrode 9 positioned to surround the beam before deflection thereof and before focusing thereof. The construction of the electrodes 6, 7, and 9 including their positioning and the size of their openings and the potentials applied thereto, as explained above, is such that, inherently, the maximum cross section of the electron beam is

substantially less than the openings in the electrodes through which the beam passes. Beam deflection is accomplished by the use of high- and low-frequency deflection coil systems 10 and 11, respectively, and the beam is maintained in focus on fluorescent screen 2 by means of focusing solenoid 12 energized by focusing battery 13.

The circuit for placing the device into operation as an anode modulated tube is simple. Annular accelerating electrode 9 is held at a constant positive potential of, for example, 2000 volts, by voltage source 14. Annular grid 6 is biased by bias circuit 15, and cathode 4 is heated by cathode source 16. Conical anode 7 is connected directly to anode 17 of final amplifier tube 18, the grid 19 of which is energized by the drop across resistor 20 connected to anode 21 of amplifier tube 22, through coupling condenser 23. Grid 19 of final amplifier tube 18 is biased by bias resistor 24 in series with bias battery 25. Grid 26 of first amplifier tube 22 has applied thereto input signals, preferably a train of television signals.

Conical anode 7 and anode 17 of final amplifier tube 18 are both energized to the same potential by anode source 27, for example, to 600 volts positive, through coupling resistor 28. Thus, anode source 27 supplies both the final amplifier tube and the cathode ray tube conical anode 7. The signal to the conical anode is supplied by the final amplifier tube 18.

Thus, the cathode ray tube will be anode modulated, with a relatively low potential on the conical anode. Final acceleration is performed by accelerating anode 9. The result of modulating the beam by this means is to completely remedy the de-focusing effect of signal voltage. The scanning lines remain constant in width across light-dark boundaries without the familiar "tailing out" effect common to prior tubes.

The direct coupling of the last amplifier tube to the modulated anode is, therefore, a distinct advantage in obtaining clearness of final picture and constancy of scanning line width. Furthermore, the use of anode modulation allows grid 6 to be used solely for the regulation of suitable background illumination, which regulation may of course be by hand or automatic, in accordance with modern television practice.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications

may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A cathode-ray tube signal reproducing device comprising an envelope, a target disposed at one end thereof, a cathode disposed at the opposite end thereof, an apertured grid adjacent said cathode for controlling the number of electrons flowing therethrough, a hollow truncated conical anode adjacent said grid, an annular accelerating anode disposed between said conical anode and said target, means for applying operating voltages to said grid and said anodes with a greater voltage being applied to said accelerating anode than to said conical anode, said grid and anodes being so proportioned that, when said operating voltages are applied thereto, the maximum cross section of the electron beam passing through said grid and anodes is substantially less than the openings therein, and means for applying a signal to said conical anode.

2. A cathode-ray tube signal reproducing de-

vice comprising a source of signal voltage including a vacuum tube having an output electrode, a cathode-ray signal reproducing tube including an electron gun having a cathode, an apertured grid adapted for limiting the number of electrons flowing therethrough to a predetermined value, a hollow truncated conical anode for concentrating said limited electrons into a beam and varying the intensity of said beam, an annular anode for accelerating said defined and modulated beam, a target for receiving said defined and modulated beam, and means for applying operating potentials to the electrodes of said tubes including a direct current connection between said vacuum tube output electrode and said first anode whereby signals are applied directly from said output electrode to said first anode and operating potentials are applied directly to said two electrodes, said grid and anodes being so proportioned that, when said operating voltages are applied thereto, the maximum cross section of the electron beam passing through said grid and anodes is substantially less than the openings therein.

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