PUBLISHED
MAY 25, 1943.
BY A. P. C.

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CATHODE RAY TUBE CONTROL CIRCUITS

Filed July 15, 1936

Serial No.
90,702

Fig. 1

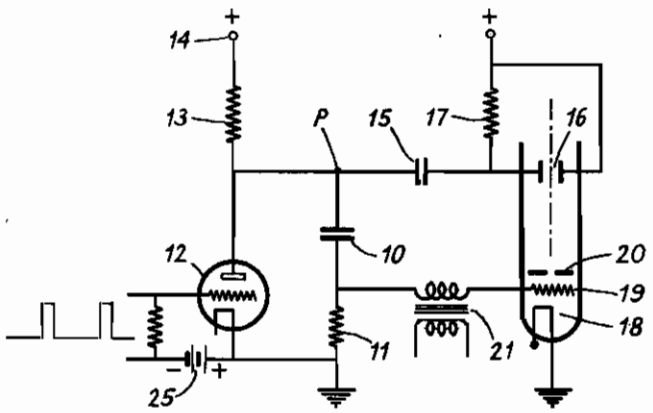


Fig. 2

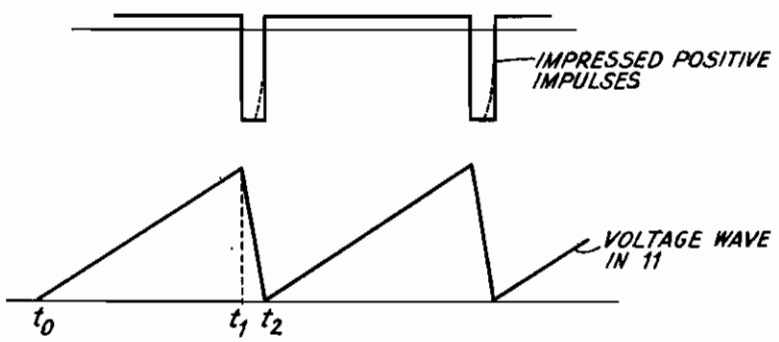
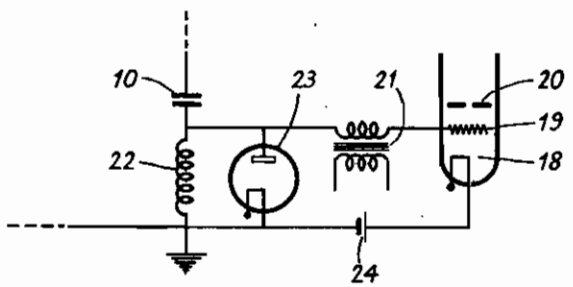


Fig. 3



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Published May 25, 1943

Serial No. 90,702

ALIEN PROPERTY CUSTODIAN

CATHODE RAY TUBE CONTROL CIRCUITS

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Application filed July 15, 1936

The invention relates broadly to a circuit arrangement for controlling the production of a cathode ray beam in cathode ray tubes employed, for instance, as transmitting or receiving tubes in television arrangements and more specifically to a circuit arrangement whereby the cathode ray beam, which has been deflected to some point in its line of deflection, is returned to an initial position and the production of the beam is blocked during the return period.

In a specific embodiment of my invention, a condenser is charged in a linear fashion and simultaneously the deflecting members of the cathode ray tube deflect the beam in one direction in accordance with the magnitude of the charge on the condenser. At predetermined intervals, a discharge path joined in parallel to the condenser is rendered conductive by electrical impulses allowing the condenser to discharge its stored charge, either completely or to a predetermined degree. The discharge of the condenser effects a drop in potential across an electrical element connected thereto and this drop is fed to a control element of the cathode ray tube blocking the beam. Simultaneously therewith the discharge in the condenser effects the return of the beam to an initial point.

As applied to the use of such a circuit in a television arrangement, during the storing period, the condenser effects the movement of the beam for a space corresponding to the one picture line and the beam may be modulated simultaneously with picture signals when the beam has reached the end of the line, the discharge of the condenser is initiated by supplied electrical impulses and the discharge is used to develop a potential which blocks the cathode ray, and the discharge itself is used to return the beam to a position corresponding to the beginning of a line of the picture. The invention will best be understood by reference to the figures in which:

Figure 1 represents one embodiment of my invention.

Figure 2 shows a series of curves representing potentials in the circuit with respect to time and

Figure 3 is another embodiment of my invention.

Referring to Figure 1, 10 is an electrical condenser used as a storage element which is charged in a linear fashion by the anode voltage supply 14 (not shown) the negative terminal of which may be grounded which charges the element 10 through a resistor 13 and a resistor 11. The anode-cathode path of a thermionic tube 12 is joined in series with the condenser 10 and the resistance element 11, and this combination is grounded at the cathode of the tube. The anode of the tube 12, together with one plate of the condenser 10, is joined to the deflecting means 16 and the cathode ray tube through a blocking condenser 15. Shunted in parallel to the deflecting plates of the cathode ray tube is a resistance element 17. The cathode ray tube itself also includes the grounded cathode 18, a control grid 19, which may also be constructed as the Wehnelt cylinder, and an anode 20. At the point where the resistance element 11 joins the condenser 10 there is a connection joining this point or junction to the grid 19 of the cathode ray tube through the secondary of a transformer 21 whose primary is adapted to be energized by picture signals for modulating the cathode ray beam. The cathode of the thermionic tube 12 is joined to a control grid of the tube through a biasing battery 25 which normally maintains the tube in a non-conductive state, and an electrical element across which input signals to the tube may be impressed. The circuit in this figure operates in the following manner.

At the time t_0 the condenser may have a zero charge or a base charge. The condenser is charged in a linear fashion in accordance with the value of the resistor 13 and resistor 11 by the anode supply voltage of the thermionic tube up to a time t_1 at which time a positive pulse is applied to the grid of tube 12 which is normally blocked. As a result of the positive pulse, the thermionic tube 12 becomes conductive and the condenser 10 discharges across the resistor 11 and the anode-cathode path of the tube. For the sake of simplicity, reference should be made to Fig. 2 which shows the shape of the discharge curves. The condenser discharges during the period t_1, t_2. At the time t_2, the charge on the condenser 10 has again dropped to its base value, which may be zero, and if at this time the positive pulse applied to the grid of tube 12 has ceased, then the condenser will again start to charge as before.

While the condenser is charging and discharging, the changing potentials across the resistance element 11 are impressed through the blocking condenser 15 to the deflecting plates 16 of the cathode ray tube, thus effecting a deflecting of the beam in a linear fashion.

Referring to Fig. 2, the relationship between the various waves with reference to time is clearly brought out, but for the sake of comparison, the positive impulses applied to the grid of the thermionic tube 11 are shown below the base

line. As shown, the positive pulse begins at the time t_1 and lasts until the condenser has discharged to its base value at the time t_2. The lower portion of the figure brings out the linear charge and discharge wave of the condenser and hence the potential drop across resistor 11. The positive pulse naturally must have a value greater than the difference between the cut-off voltage of the thermionic tube 12 and the value of the biasing battery 25 or else the tube will not be rendered conductive thereby. If, due to inherent inductive effects in the output circuit of the thermionic tube 12, the condenser charge would not be strictly a linear function, then this may be compensated by the wave shape of the positive impulses impressed on the grid of the thermionic tube 12 and such is illustrated by the dotted portion, that is to say, that the fact that compensation for non-linearity may be accomplished in such a fashion.

Referring to Fig. 3, a choke coil 22 supplants the resistor 11, shown in Fig. 1, and a detector is connected in parallel to said choke coil. During the charging of the condenser 10 a voltage is built up across the choke coil which is short-circuited by detector 23 so that the control grid during the time of charging receives only the picture impulses applied to the transformer 21. A constant bias is supplied by the voltage source 24.

During the time t_1, t_2, that is, when the condenser is discharging, the upper end of the choke coil 22 becomes negative with respect to the lower end and consequently, the detector 23 is inoperative and this voltage is impressed on the control element 19 in the cathode ray tube and acts as a blocking voltage. Since the beginning of the charging performance of the condenser 10, the choke coil 22 may oscillate at its natural frequency, and these oscillations may cause a singular or multiple blocking of the cathode ray at a time shortly after the time period t_0, the detector 23 acts as a short-circuit to prevent these oscillations and hence multiple blocking is avoided thereby.

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