Dec. 1, 1942. C. L. FAUDELL 2,303,924

TELEVISION TRANSMITTING OR RECEIVING SYSTEM

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Fig. 1

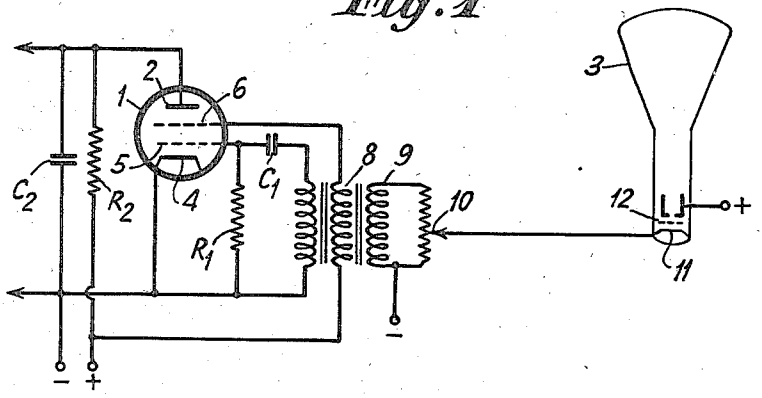



Fig. 2

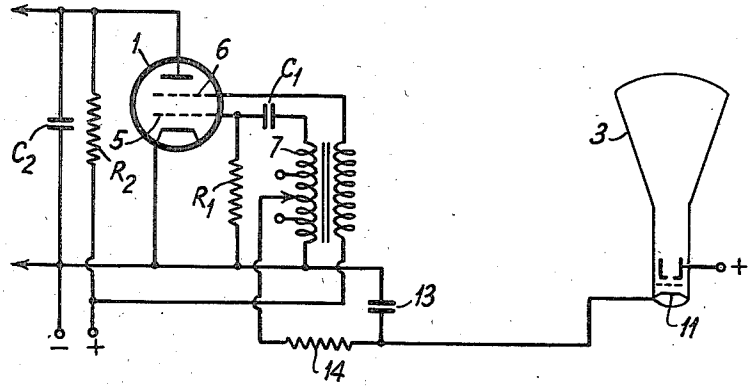
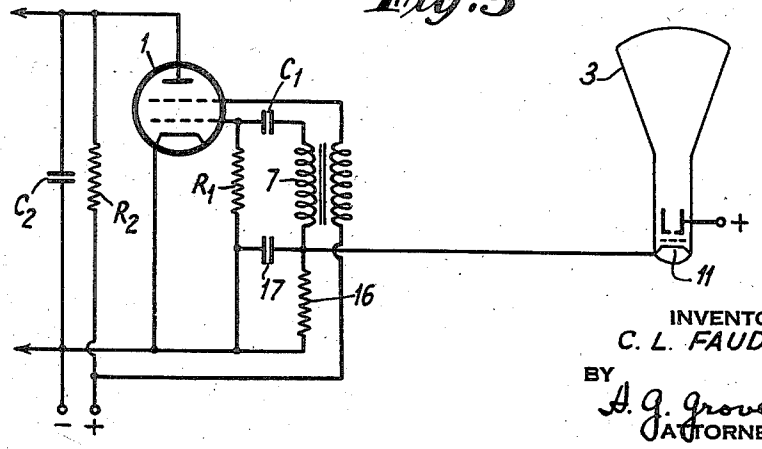



Fig. 3




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Fig. 4

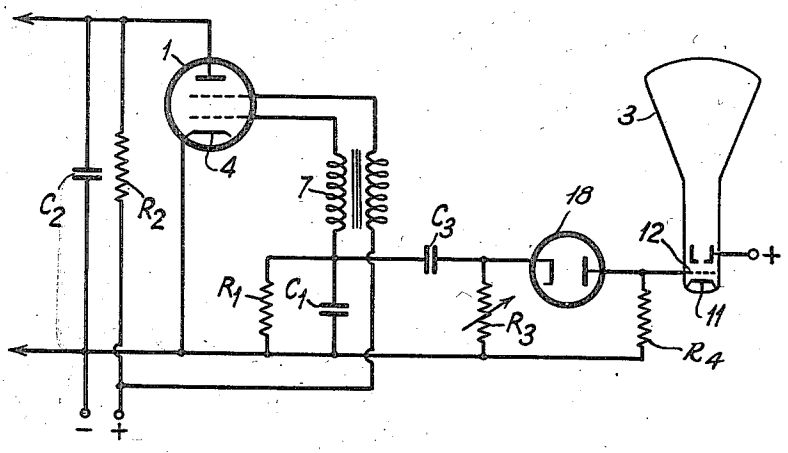
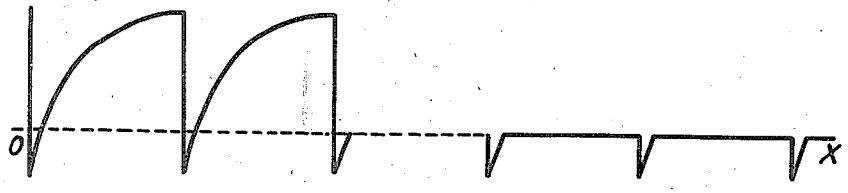



Fig. 5




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# UNITED STATES PATENT OFFICE

2,303,924

## TELEVISION TRANSMITTING OR RECEIVING SYSTEM

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Application March 7, 1940, Serial No. 322,678
In Great Britain March 7, 1939

4 Claims. (Cl. 250—27)

The present invention relates to a television transmitter or receiver of the kind employing a cathode ray tube in which the beam of cathode rays is subjected to periodic deflections so that the beam is caused to scan continuously the screen of the cathode ray tube.

In a television transmitter or receiver of the above kind, during the line and frame return periods the cathode ray beam is usually suppressed so as to afford no visible trace on the screen during these periods.

It is the object of the present invention to provide improved means for suppressing the beam during the frame and/or line return periods the invention being applicable either to television transmitters or to receivers of the above kind.

According to the present invention a television receiver or transmitter of the above kind is provided having a thermionic valve relaxation oscillator for generating potentials of a substantially saw tooth waveform for deflecting the cathode ray beam, wherein said valve is arranged to be rendered conducting periodically for generating the short flanks of the saw tooth waveform and wherein during the conducting period said valve is arranged to generate a bias potential which is applied to said cathode ray tube to suppress the beam during the return periods of the beam.

Reference will now be made to the accompanying drawings which comprise Figures 1 to 5, Figures 1 to 4 illustrating circuits embodying the present invention by way of example, and Fig. 5 being an explanatory diagram.

In Figure 1 the present invention is illustrated applied to a known blocking oscillator which is employed to generate saw-tooth potentials for application to the frame deflecting means of a cathode ray tube. When the valve 1 is non-conducting, the condenser $C_2$ is steadily charged from the source of supply, indicated by the conventional positive and negative signs, through the resistance $R_2$ to generate the long flank of the saw tooth waveform potentials. The control grid 5 and screen grid 6 of the valve 1 are coupled together by the windings 7 and 8 of a transformer, the grid 5 being connected to the cathode 4 by a circuit which includes a condenser $C_1$ and grid leak resistance $R_1$. On the valve 1 being rendered conducting, for example by the application of a synchronising pulse, the valve is rendered conducting and causes the rapid discharge of the condenser $C_2$, thus generating the short flank of the saw-tooth and consequently the frame return deflection of the cathode ray beam, and at the same time a pulse of current flows in the coil 8. The valve remains conducting until, due to the flow of grid current to the grid 5 as a result of the coupling between coils 7 and 8, the condenser $C_1$ becomes charged to such a value of negative potential that current ceases to flow from the cathode 4 to the anode 2. In accordance with the present invention when the valve 1 is rendered conducting it serves to generate a bias potential which is applied to the cathode 11 of the cathode ray tube to extinguish the beam during the frame return period when the short flank of the saw tooth wave potentials in being produced.

A coil 9 is coupled with the coil 8 and connected with the coil 9 is a resistance 10. A potential is thus set up across the resistance 10 on the occurrence of each frame-return deflection of the cathode ray beam. The resistance 10 is suitably tapped and connected to the cathode 11 of the cathode ray tube 3, the values of the components 9 and 10 of the circuit being adjusted so that the potential applied to the cathode 11 is of sufficient value, and of the correct phase, to cause the suppression of the cathode ray beam on a frame return periodic deflecting voltage being applied to the scanning means. If the resistance 10 is connected to the modulating electrode 12 of the cathode ray tube 3, the potential applied to electrode 12 would require to be 180 degrees out of phase with the potential utilised when connection is made to the cathode 11.

The circuit illustrated in Figure 2 is substantially the same as that of Figure 1, but here the blocking potential applied to the cathode 11 of the cathode ray tube is derived from a tapping on the coil 7 which is connected in the circuit of the grid 5 of the valve 1. The cathode 11 is connected to the tapping on the coil 7 by way of a condenser 13 and resistance 14, the condenser 13 and resistance 14 being connected in parallel between the tapping point and one end of the coil 7, the potential produced at the junction of condenser 13 and resistance 14 being applied to the cathode 11. The condenser 13 and resistance 14 produce an increase of the duration of the pulses of current and thus the period for which the blocking potential applied to the cathode 11 is effective may be adjusted, ensuring that it is effective at least for the period during which the beam is deflected to its required position.

The circuit illustrated in Figure 3 is also substantially the same as Figure 1, but the cathode 11 of the cathode ray tube is connected to the end of the coil 7, which coil 7 is connected by a resistance 16 and condenser 17, arranged in parallel, to the cathode of valve 1 instead of directly to the cathode of valve 1. A positive pulse of current is formed across the resistance 16 when the valve 1 is rendered conducting and this pulse decays through the condenser 17. The amplitude of the pulse may be adjusted by variation of the resistance 16, its duration adjusted by variation of the capacity of the condenser 17.

The major part of the circuit illustrated in

Fig. 4 is substantially the same as in Fig. 1, but the condenser $C_1$ is now connected at the opposite end of the coil 7 to the cathode 4 of the valve 1, the condenser C being shunted by the resistance $R_1$. A condenser $C_3$ is connected from the junction of resistance $R_1$ and condenser $C_1$ to the cathode of a diode 18, the cathode of the diode being connected to the cathode of valve 4 by a variable resistance $R_3$, whilst the anode of diode 18 is connected to the cathode of valve 4 by a resistance $R_4$, the voltages appearing across $R_4$ being applied to the grid 12 of the cathode ray tube 3.

An exponential sawtooth potential of considerable amplitude, of the order of 150 volts, is developed across the cathode 4 and the junction of the resistance $R_1$ and condenser $C_1$, the waveform of this potential being left illustrated in the left-hand portion of Fig. 5. The diode 18 acts as an amplitude selector, becoming conductive only when the potential at the junction of resistance $R_1$ and $C_1$ is below a suitable value indicated by the line OX in Fig. 5; when the potential of the junction of $R_1$ and $C_1$ exceeds this value the diode 18 is rendered non-conducting. Thus only the negative tips of the potential waveform illustrated in the right-hand portion of Fig. 5, are effective to apply a voltage to the cathode ray tube 3. The voltages then appearing across $R_4$ being negative, the grid 12 of cathode ray tube 3 causes substantial suppression of the cathode ray beam for the period that the sawtooth potential lies below the line OX.

The amplitude of the sawtooth potential may be varied, by altering the value of resistance $R_3$ or resistance $R_4$, so as to adjust the bias applied to the diode 18, and since the rise in potential is of an exponential form, adjusting the bias applied to the diode 18 also serves to adjust the period for which the cathode ray beam of tube 3 is substantially suppressed. The time constant produced by $R_3$ and $C_3$ must be appreciably greater than that of $R_1$ and $C_1$ so that the waveform of the exponential sawtooth is not substantially affected with variations in $R_3$.

The blocking potential obtained from a coil such as 7 or 8 or from a resistance connected with one of these coils may be applied to any convenient electrode of the cathode ray tube. Also, although embodiments of the present invention have been described in connection with a valve providing frame frequency deflections the present invention may also be employed in connection with the line frequency deflections. As herein-before described the valve 1 serves to discharge the condenser $C_2$, but the invention may also be applied to cases where the valve serves to charge a condenser, the long flank of the saw-tooth wave form being generated by the charge leaking away from the condenser.

I claim:

1. Apparatus for suppressing a cathode ray beam developed within a cathode ray tube comprising electrostatic energy storage means, means for storing energy in said electrostatic energy storage means, a thermionic tube having anode, cathode and at least one control electrode, said electrostatic energy storage means being connected substantially in parallel with the anode-cathode space discharge path of said tube, a time constant circuit connected in the control electrode-cathode path of said tube whereby a pulse is developed therein during the discharge of the energy stored in said electrostatic energy storage means, and a connection between the resistive member of said time constant circuit and an element of said cathode ray tube whereby at least a portion of the pulse developed in the control electrode-cathode circuit of said tube is impressed onto an element of said cathode ray tube to suppress the beam.

2. A cathode ray beam suppression system for suppressing a cathode ray beam developed within a cathode ray tube comprising a thermionic tube having anode, cathode and at least one control electrode, electrostatic energy storage means connected substantially in parallel with the anode-cathode space discharge path of said thermionic tube, means for storing energy in said electrostatic energy storage means during the time when said tube is impervious to electron flow, a time constant circuit connected in the control electrode-cathode path of said tube in which energy is stored during the discharging of the energy in said electrostatic energy storage means through the space discharge path of said thermionic tube, uni-directional conducting means, and means for impressing the energy stored in said time constant circuit onto said uni-directional conducting means, and means for impressing the output of said uni-directional conducting means onto an electrode of the cathode ray tube in which said cathode ray beam is developed for suppressing the said beam.

3. Apparatus for suppressing a cathode ray beam developed within a cathode ray tube comprising electrostatic energy storage means, means for storing energy in said electrostatic energy storage means, a discharge path for said electrostatic energy storage means comprising the space discharge path of a thermionic tube, said tube having anode, cathode, and at least one control electrode, the anode-cathode space discharge path of said thermionic tube being connected substantially in parallel with said electrostatic energy storage means, a time constant circuit connected in the control electrode-cathode path of said thermionic tube, means for feeding back to a control electrode-cathode path of said tube a portion of the energy developed in the anode-cathode path of said tube during the discharge of said electrostatic energy storage means, and means for impressing at least a portion of said fed back energy onto an element of the cathode ray tube to suppress the cathode ray beam.

4. Apparatus for suppressing a cathode ray beam developed within a cathode ray tube comprising electrostatic energy storage means, means for storing energy in said electrostatic energy storage means, a discharge path for said electrostatic energy storage means comprising the space discharge path of a thermionic tube, said tube having anode, cathode, and at least one control electrode, the anode-cathode space discharge path of said thermionic tube being connected substantially in parallel with said electrostatic energy storage means, means for feeding back at least a portion of the energy in the anode-cathode circuit of said thermionic tube during the discharge of said electrostatic energy storage means to a control electrode-cathode path of said thermionic tube, and means coupled to said control electrode-cathode path of said thermionic tube and to an element of said cathode ray tube for impressing a portion of the fed back energy onto the cathode ray tube.

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