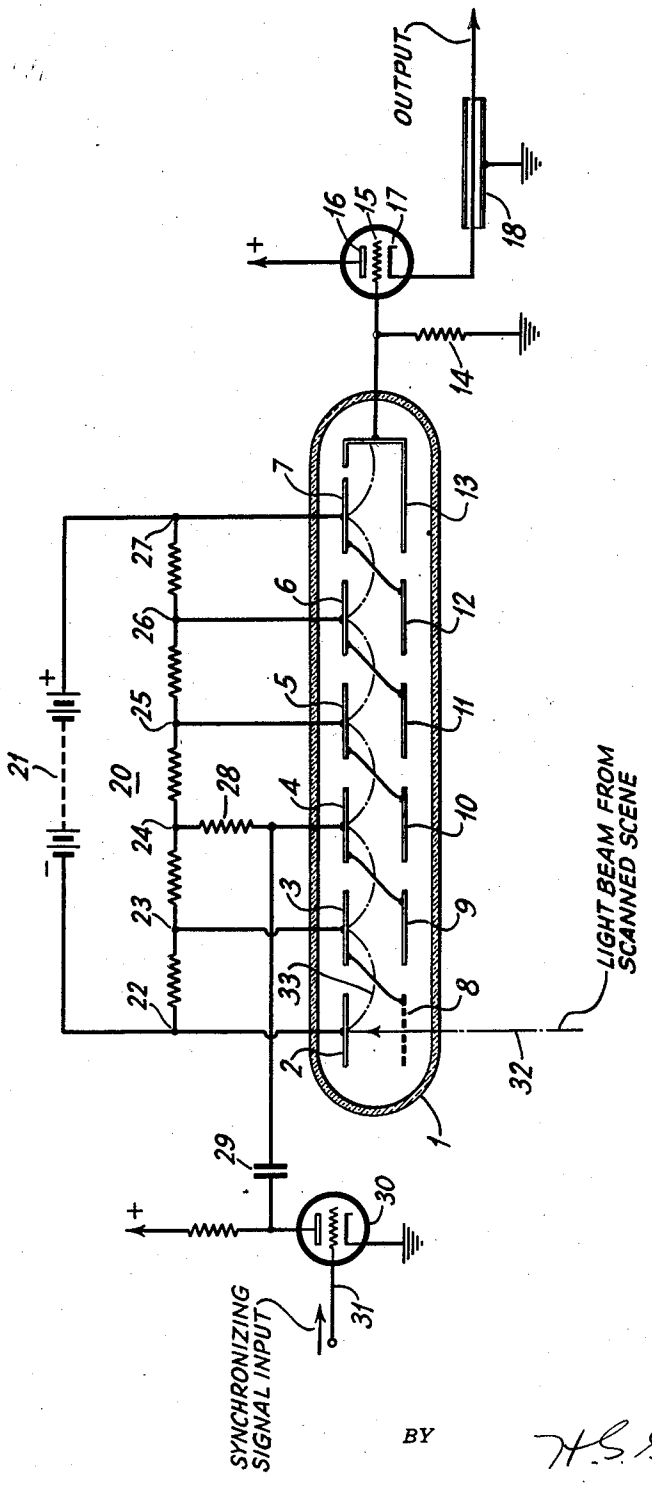
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SYNCHRONIZING CIRCUIT

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SYNCHRONIZING CIRCUIT

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This invention relates to electronic circuits and more particularly to electronic circuits useful in television for suppressing return line effects by synchronizing signals.

In television transmitting circuit arrangements it has already been proposed to render the picture current amplifier inoperative during the line and/or picture flyback by supplying such a high negative voltage to the grid of one of the amplifying tubes that the anode-current of this tube is cut off. This measure has the drawback, however, that due to the abrupt cutoff of the amplifying tube a considerable impulse is produced, because in the usual amplifying tubes a steady anode-current always flows during operation, which current is then suddenly suppressed during the line or picture flyback.

The invention is based on the recognition that when using a multiplicator tube for the conversion of the picture point brightnesses into corresponding picture-currents in a manner known per se, the above drawback can be avoided if, according to the invention, during the time elapsing between the transmission of two succeeding lines and/or pictures the paths of the electrons in the multiplicator tube are electrically or magnetically influenced so that the output current of the multiplicator tube is substantially suppressed.

In fact, there does not flow a steady current in such a multiplicator tube so that if the electron paths are electrically or magnetically deflected in such a manner that the output current is suppressed no impulse ensues.

In television transmitting circuit-arrangements it is customary to produce synchronizing impulses between the transmission of two succeeding lines or pictures. These impulses are preferably used for deflection of the electron paths in the multiplicator tube, for instance, by superimposing these impulses upon the bias of at least one electrode so as to effect the desired deflection.

For the purpose of describing the invention in detail, reference will be made to the accompanying drawing, which shows an arrangement of a multiplier tube, which is rendered inoperative periodically by the synchronizing impulses.

The multiplier tube 1 contains a photo-cathode 2 and a number of secondary emitting electrodes 3, 4, 5, 6, 7. Facing the photo-cathode 2 a grid 8 is placed which is connected to the secondary emitting electrode 3 and facing the secondary emitting electrodes 3, 4, 5, 6 are placed electrodes 9, 10, 11, 12 respectively connected to the secondary emitting electrodes 4, 5, 6, 7. The tube 1 is at the end provided with a collecting electrode 13 which is earthed by means of a resistance 14. This electrode 13 is connected to the control grid 15 of an amplifier tube 16, the cathode 17 of which is connected to earth through a coaxial cable 18 and a remote resistance, not shown, which resistance forms part of the input circuit of the picture current amplifier of the television transmitter. The photo-cathode 2 and the secondary emitting electrodes 3, 4, 5, 6, 7 are connected to the taps 22, 23, 24, 25, 26, 27 of a voltage divider 20 which is fed by a source of direct current 21.

In the connection between the secondary emitting electrode 4 and the tap 24 a resistance 28 is inserted. The secondary emitting electrode 4 is by means of a condenser 29 connected to the anode of a tube 30 the control grid 31 of which is supplied with positive synchronization impulses.

Within the tube 1 a magnetic field is applied perpendicular to the plane of the drawing, which causes the electrons free from the photo-cathode 2 by an impinging beam of light 32 which is intensity modulated to follow the dotted trace 33 to the secondary emitting electrode 3. Here each electron frees a number of secondary electrons, supported by the electric field between the electrodes 9 and 3, and so on, till finally an amplified modulated current reaches the collecting electrode 13. The beam of light is obtained by scanning a film picture and representative of the lights and shades of the frame being scanned.

When now a positive synchronizing impulse is supplied to the control grid 31 of the tube 30, this causes a voltage drop of the anode of this tube, and a negative impulse reaches the secondary emitting electrode 4 by means of the condenser 29. The resistance 28 prevents the propagation of this impulse to the other secondary emitting electrodes.

During this impulse substantially no electrons can reach the secondary emitting electrode 4 so that the output current of the tube 1 is suppressed.

In those cases in which the duration of the synchronizing impulses is shorter than the required time elapsing between the transmission of two succeeding lines or pictures additional impulses of the desired duration may be produced for influencing the multiplicator tube, which impulses may then by synchronized by the synchronizing impulses, if desired.

Having described my invention, what I claim is:

1. A synchronizing system comprising a thermionic amplifier having an input and output circuit, an electron multiplier having a plurality of secondary electron emissive electrodes and a collector electrode, means to supply synchronizing signals to the input circuit of said amplifier, impedance means connecting the output circuit of said amplifier to one of the secondary emissive electrodes of said multiplier to supply negative potentials thereto, and an amplifier connected to the collector electrode for amplifying both synchronizing signals and signals representative of an image to be transmitted.

2. A synchronizing system comprising a thermionic amplifier having an input and output circuit, an electron multiplier having a photoelectron emissive cathode, a plurality of secondary electron emissive electrodes and a collector electrode, means to supply potentials to the cathode and said electrodes, an impedance connected between one of said plurality of secondary electron emissive electrodes and said potential means, means to supply synchronizing signals to the input circuit of a thermionic amplifier, connections from the output circuit of said thermionic tube to said impedance for supplying synchronizing impulses of negative potential, and an output amplifier connected to the collector electrode.

3. A synchronizing system comprising a thermionic amplifier having an input and output circuit, an electron multiplier having a photoelectron emissive cathode, a plurality of secondary electron emissive electrodes and a collector electrode, means to supply potentials to the cathode and said electrodes, a resistance connected between one of said plurality of secondary electron emissive electrodes and said potential means, means to supply synchronizing signals to the input circuit of a thermionic amplifier, connections from the output circuit of said thermionic tube to said resistance for supplying synchronizing impulses of negative potential, and an output amplifier connected to the collector electrode.

4. In a television transmitting system wherein is provided an electron multiplier having a plurality of secondary electron emissive electrodes, the method of supplying synchronizing impulses intermediate consecutive trains of electrical signals representative of an image to be transmitted which includes the steps of periodically supplying negative potential to one of the secondary electron emissive electrodes whereby the potential of the electrode is rendered lower than the threshold value at which secondary electron emission takes place.

5. In a television transmitting system, wherein is provided an electron multiplier having a plurality of secondary electron emissive electrodes, the method of supplying synchronizing impulses intermediate consecutive trains of electrical signals representative of an image to be transmitted, which includes the steps of obtaining synchronizing signals from a source; normally supplying positive potential to one of the plurality of secondary electron emissive electrodes, and superimposing the obtained synchronizing impulse with opposite polarity upon the positive potential supplied to said one secondary electron emissive electrode, said obtained synchronizing impulses having a magnitude of the same order as the supplied potential.

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