Feb. 21, 1939. G. B. BANKS 2,148,096

OSCILLATION GENERATOR

Filed June 6, 1936

Fig. 1

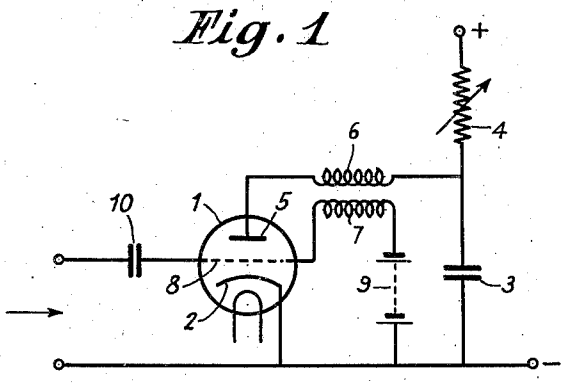
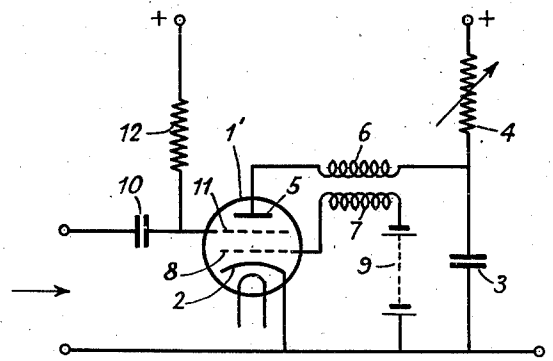


Fig. 2



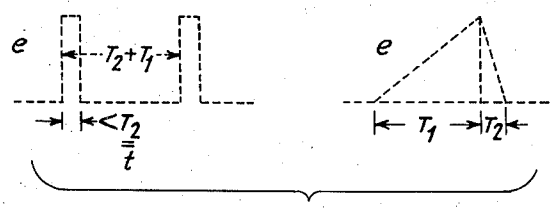


Fig. 3.

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OSCILLATION GENERATOR

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5 Claims. (Cl. 250—36)

This invention relates to electrical impulse generators and more specifically to apparatus for producing impulses of saw tooth or approximately saw tooth wave form. Such impulse generators have numerous applications, one of the most important being to provide potential or current saw-tooth waves for producing deflection for scanning action in cathode ray tube television apparatus.

According to this invention an electrical saw-tooth wave or similar impulse generator comprises a condenser, a circuit for continuously charging said condenser at a predetermined rate, an electron discharge device having its output electrode-cathode space in a circuit shunted across said condenser, means for applying a fixed bias potential to a control electrode of said device, means for coupling the output electrode circuit of said device to the circuit of said control electrode, and means for taking off saw tooth wave impulses from across said condenser, the whole arrangement being such that during the charging period of said condenser no current flows through the electron discharge device but when current does flow the coupling between the output electrode and control electrode circuits of said device produces a positive impulse upon the control grid so that a cumulative effect is produced whereby the condenser is rapidly discharged through said device.

In general when an impulse generator in accordance with this invention is employed for cathode ray tube television purposes, it will be required to synchronise the impulses generated with incoming synchronising impulses and such synchronisation may be effected by applying incoming synchronising impulses in the form of positive impulses either to the control electrode of the electron discharge device or to an additional grid provided in the said device. If desired the whole arrangement may be made such that the condenser when fully charged has a potential insufficient alone to cause current to flow in the output electrode circuit of the device in the face of the steady control electrode bias, so that such current cannot flow and the condenser therefore cannot discharge until a synchronising signal is received.

The invention is illustrated in the accompanying drawing in which:

Figure 1 is one embodiment of my invention.

Figure 2 is a modified form of my invention, and

Figure 3 is a set of explanatory curves.

Referring to Figure 1 the impulse generator therein shown and which is suitable for use as a saw-tooth wave generator for cathode ray tube television purposes comprises a triode 1 whose cathode 2 is connected to one terminal of a condenser 3 the other terminal of which is connected through an adjustable resistance 4 to a source (not shown) of positive potential which may serve both as a source of anode potential and as a charging source for the condenser. The junction point of the adjustable resistance 4 with the condenser 3 is connected to the anode 5 of the valve 1 through a coil 6 which is inductively coupled to a second coil 7 in the grid circuit of the valve. This grid circuit includes in series in the order stated, and starting from the grid 8, the coil 7 and a source 9 of negative bias potential whose positive potential is connected to the cathode. Synchronising impulses are fed as positive impulses to the control grid 8 through a suitable coupling condenser 10. The negative bias on the grid is such that no current can flow through the anode-cathode space of the valve while the condenser 3 is charging. As, however, the condenser charges the anode potential increases. When anode current commences to flow a positive impulse is applied to the grid of the valve by virtue of the coupling between the coils 6 and 7. Accordingly, the internal resistance of the valve drops rapidly with a cumulative action and the condenser 3 is rapidly discharged through the valve down to a predetermined limit. The condenser 3 then begins to re-charge again and the cycle of operations is repeated so that saw tooth waves may be taken off from across the said condenser 3. The rate of charge of the condenser is so selected that the valve reaches a condition near the point at which anode current will begin to flow just before an incoming synchronising signal is due to appear so that when a synchronising signal comes in, the valve is in effect "triggered over". In fact, if desired, the arrangement may be made such that the condenser when fully charged, does not reach a potential sufficient to cause anode current to flow so that the said condenser can only be discharged when a synchronising signal is received.

It is not necessary in carrying out this invention to apply synchronising signals to the control grid. For example, a screen grid valve may be employed and incoming synchronising impulses may be applied to the screen grid. Figure 2 shows a modification of this kind the circuit of Figure 2 being the same as that of Figure 1 except that the triode 1 is replaced by a screen grid valve 1' having a screen grid 11 to which synchronising

signals are applied through condenser 10 and which is maintained at a suitable positive potential through resistance 12.

The resistance 4 of Figures 1 and 2 may be, and preferably is, constituted by any suitable substantially constant current device known per se; e. g., by a saturated diode or a screen grid valve.

It will be noted that with a saw tooth wave impulse generator in accordance with this invention, the action does not depend upon the setting up of oscillations in the grid circuit, so that the invention is distinct from the known so-called blocking oscillator circuit arrangements wherein short bursts of oscillations are caused to occur on the grid of a valve which is rendered non-conductive during the charging period of a condenser by virtue of the accumulation of a negative charge on the grid as a result of such a short burst of oscillations. In arrangements in accordance with this invention the grid receives a permanent bias.

What I claim is:

1. An apparatus for producing electrical oscillations of a serrated wave form comprising a condenser, means for charging said condenser at a predetermined rate, an electron discharge tube, a series electrical circuit comprising the anode-cathode path of said tube, an inductive element and the condenser, means for coupling said inductive element to a cold electrode of the electron discharge tube, means for maintaining a control element of said tube at a substantially constant predetermined cut-off value during the charging period of said condenser, and means for supplying said control element of the tube with intermittent sets of positive electric pulses of such value as to render the electron tube conductive with each set.

2. An apparatus for generating a serrated wave form comprising a multigrid vacuum tube having anode, cathode and a plurality of grid electrodes, electrical storage means connected in the anode-cathode circuit of said tube, variable means for storing energy in said electrical storage means, means for maintaining the tube in a normally blocked state and maintaining a control grid thereof at a substantially constant potential during storing of said energy, means for controlling the potential of one of the grids of the tube to initiate discharge of said storage means, and means for feeding back a portion of the discharge energy to another of the grids of the tube to accelerate the discharge.

3. An apparatus for generating a serrated wave form comprising a multigrid vacuum tube having anode, cathode and a plurality of grid electrodes, electrical storage means connected in the anode-cathode circuit of said tube, variable means for storing energy in said electrical storage means, means for maintaining the tube in a normally blocked state and maintaining a control grid thereof at a substantially constant potential during storing of said energy, means for intermittently raising the potential of one of the grids of the tube to initiate discharge of said storage means, and means for feeding back a portion of the discharge energy to another of the grids of the tube to accelerate the discharge.

4. An apparatus for generating a serrated wave form comprising a multigrid vacuum tube having anode, cathode and a plurality of grid electrodes, electrical storage means connected in the anode-cathode circuit of said tube, thermionic means for storing energy in said electrical storage means, means for maintaining the tube in a normally blocked state and maintaining a control grid thereof at a substantially constant potential during storing of said energy, means for controlling the potential of one of the grids of the tube to initiate discharge of said storage means, and means for feeding back a portion of the discharge energy to another of the grids of the tube to accelerate the discharge.

5. An apparatus for generating a serrated wave form comprising a multigrid vacuum tube having anode, cathode and a plurality of grid electrodes, electrical storage means connected in the anode-cathode circuit of said tube, thermionic means for storing energy in said electrical storage means, means for maintaining the tube in a normally blocked state and maintaining a control grid thereof at a substantially constant potential during storing of said energy, means for intermittently raising the potential of one of the grids of the tube to initiate discharge of said storage means, and means for feeding back a portion of the discharge energy to another of the grids of the tube to accelerate the discharge.

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