Oct. 28, 1941. G. R. TINGLEY 2,260,546

MEANS FOR CONTROLLING THE DEFLECTION OF CATHODE RAY AND LIKE BEAMS

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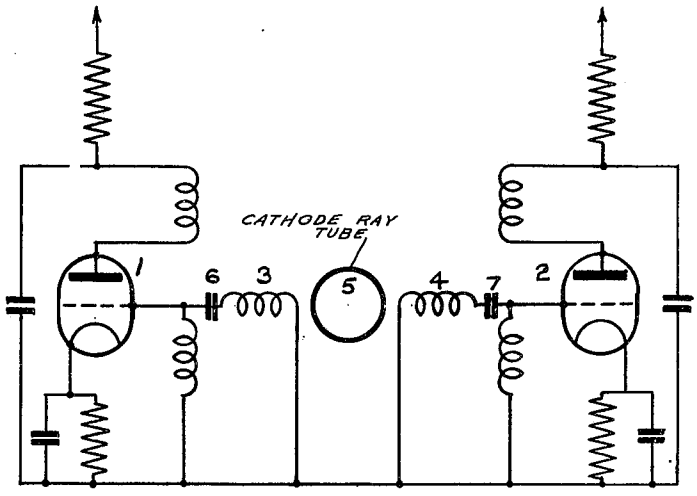


Fig. 1

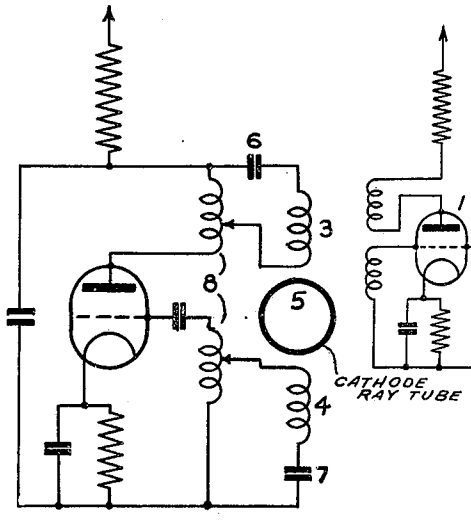


Fig. 2

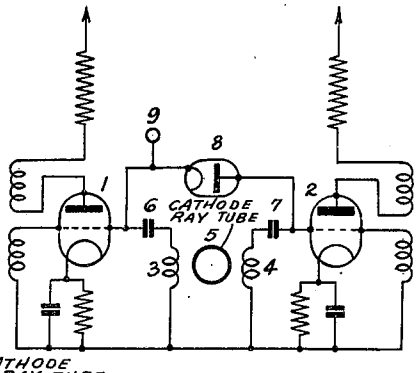


Fig. 3

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MEANS FOR CONTROLLING THE DEFLECTION OF CATHODE RAY AND LIKE BEAMS

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2 Claims. (Cl. 250—27)

This invention relates to improvements in electrical oscillation generators and is especially concerned with oscillation generators for controlling the deflection of the electron beam in a cathode ray tube or like electron discharge device.

In cases where an electron beam of high velocity is required to be deflected in space, certain known types of scanning oscillator are found to be unsatisfactory owing to the difficulty of obtaining sufficient power to produce adequate deflection of the beam without causing excessive grid current to flow and high voltages to develop across the valve electrodes during the flyback periods. The present invention seeks to provide an improved form of scanning oscillator which produces adequate power for deflecting a high velocity electron beam without the aforementioned disadvantages.

According to the present invention there is provided means for deflecting the electron beam of a cathode ray tube or like electron discharge device comprising a plurality of electromagnetic coils so disposed as to produce an appropriate magnetic field through which said beam passes, each of said coils being supplied with energy from a separate source.

According to one aspect of the present invention each of said coils is supplied with energy by connection to a suitable point in the circuit of a separate thermionic valve oscillation generator. To synchronise the several generators synchronising impulses may be applied to one of them, the others being locked in step by reason of the magnetic coupling between the several coils. Alternatively, and preferably, however, the grids of the several oscillating valves may be interconnected and synchronising impulses applied to the common lead.

According to another aspect of the present invention one of said coils is supplied with energy by connecting it, in series with a suitable condenser, across a portion of the grid winding of the feedback transformer of a scanning oscillator, while the other of said coils is similarly supplied with energy from the anode winding of the transformer.

In order that the present invention may be more particularly described reference is now made to the accompanying diagrammatic drawing comprising Figures 1, 2 and 3 each of which illustrates an embodiment of the present invention.

In Figure 1 two scanning oscillators 1 and 2 of the magnetically back-coupled type described in British Patent Specification No. 456,666 each feed one of the deflecting coils 3 and 4 arranged round the neck of a cathode ray tube 5. The coils 3 and 4 are connected across the grid windings of the appropriate oscillating valves through condensers 6 and 7 respectively.

By virtue of the magnetic coupling between the coils 3 and 4 it is necessary to synchronise one only of the oscillators 1 and 2 as on the flyback of one oscillator a large negative pulse is induced in the grid circuit of the other and holds it in step. The circuit constants are so arranged that either oscillator can be made to control or drive the other. In a preferred embodiment shown in Fig. 3 the grids of the oscillating valves 1 and 2 are connected together and synchronising impulses may be applied to their common lead. Equality of the magnetic fields generated by the two oscillators, which is necessary for good focus over the whole of the scanned area produced by the coils 3 and 4 may be obtained by suitable adjustments of the anode potentials applied to the oscillating valves 1 and 2.

In Figure 2 the deflecting coils 3 and 4 are connected through appropriate condensers 6 and 7 across appropriate portions of the anode and grid windings of the feedback transformer 8 of a scanning oscillator. In this case equality of the magnetic fields may be obtained by varying the tapping points on the windings of the transformer 8.

An alternative embodiment of the invention will now be described with reference to Figure 3 of the accompanying drawing. In this figure an oscillating valve 1 operating in a circuit of the kind described in British Patent Specification No. 456,666 feeds a deflecting coil 3 associated with a cathode ray tube 5 through a condenser 6. A second oscillating valve 2 connected in a circuit similar to that of the valve 1 feeds a deflecting coil 4 also associated with the cathode ray tube 5 through a condenser 7. The grid of the valve 1 is connected to the cathode of a diode 8, the anode of which is connected to the grid of the valve 2. Synchronising impulses may be applied to the grid of the valve 1 from a terminal 9.

It is found that when the coupling between the coils 3 and 4 is weak and in the absence of the diode 8 more energy is supplied to the coil 4 than to the coil 3 so that the scan produced on the screen of the cathode ray tube 5 is distorted. When the diode 8 is provided in accordance with the present invention the amount of energy supplied to each of the deflecting coils is substantially equal so that an undistorted scan results.

One advantage gained by using the present in-

vention is that phase differences in the times of initiation of a cycle of operation of each of the oscillating valves are avoided and also the difficulty of loss of synchronism is overcome. Another advantage is that the energy supplied to each deflecting coil is substantially equal to that supplied to the other coil.

As adumbrated above the invention is not limited to the use of two valve oscillation generators and any number may be used, each oscillator energising one or more magnetic coils.

The present invention is not limited to the use of valves operating in circuits as described in British Patent Specification No. 456,666 but may be employed with other types of scanning oscillator.

I claim:

1. In combination, a cathode ray tube, means for deflecting the electron beam of the cathode ray tube in the same direction comprising a plurality of electromagnetic coils each producing an appropriate magnetic field through which said beam passes, the fields thus produced being of the same strength and additive, and a separate thermionic valve oscillation generator for supplying alternating current energy to each coil, said valves having grids electrically joined together.

2. The combination according to claim 1, and a unilateral conducting device through which said grids are interconnected.

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