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CATHODE RAY TUBE ARRANGEMENT

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Fig.1.

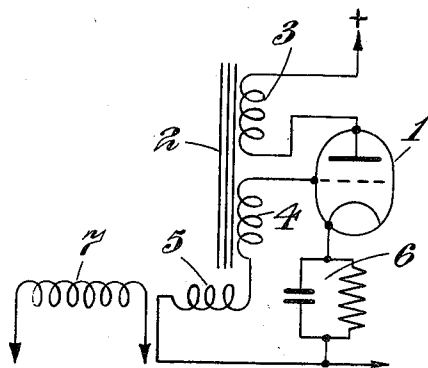


Fig. 2.

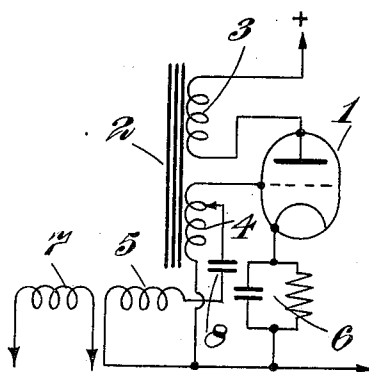


Fig. 3.

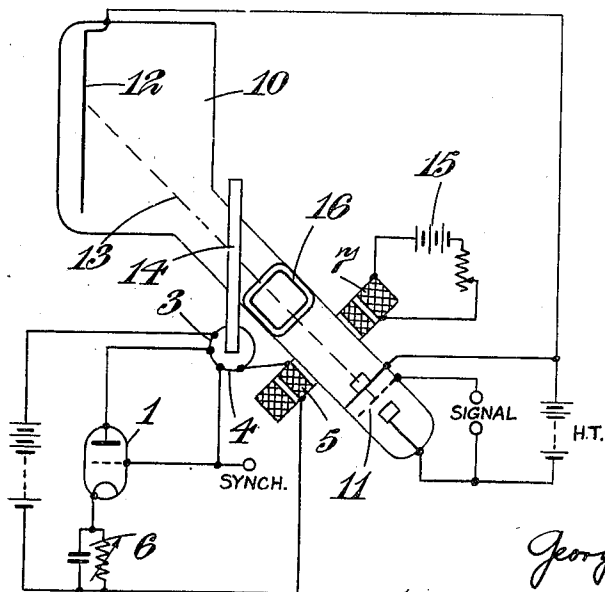
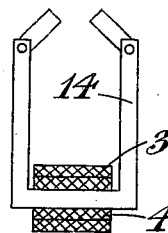


Fig. 4.



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CATHODE RAY TUBE ARRANGEMENT

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3 Claims. (Cl. 250—27)

This invention relates to improvements in cathode ray tube arrangements and is especially concerned with a method of operating a cathode ray tube of the type in which the fluorescent screen is inclined to the direction of the undeflected cathode ray.

In the operation of cathode ray tubes of this type it is necessary to provide a deflecting field for deflecting the cathode ray in the direction in which the fluorescent screen is inclined to the undeflected ray which varies not linearly with time but which is such that the rate of movement of the ray along the surface of the screen is constant. It is also necessary to vary the focussing field as the ray is deflected over the screen so as to bring the ray to a focus on the screen at all times.

The present invention seeks to provide an improved circuit arrangement for effecting both these requirements simultaneously.

According to the present invention there is provided a circuit arrangement for deflecting and focussing the electron beam of a cathode ray tube comprising a scanning oscillator having connected thereto an electro-magnetic coil so disposed in relation to a further magnetic coil for focussing said electron beam as to cause said electron beam to be maintained substantially focussed in all positions upon a scanned member which is inclined to the undeflected position of said electron beam, the connections of first said electro-magnetic coil to said scanning oscillator being such that the sawtooth deflecting field derived therefrom is modified to produce a substantially uniform rate of movement of said electron beam over said scanned member in at least one direction.

According to a feature of the present invention there is provided a circuit arrangement for deflecting and focussing the electron beam of a cathode ray tube comprising a thermionic valve having its anode and grid circuits coupled by means of a transformer so that sawtooth deflecting fields may be derived therefrom and having connected to either said anode circuit or said grid circuit an electro-magnetic coil so disposed in relation to a further electro-magnetic coil for focussing said electron beam as to cause said electron beam to be maintained substantially focussed in all positions upon a scanned member which is inclined to the undeflected position of said electron beam, the connections of first said electro-magnetic coil to said scanning oscillator being such that the sawtooth deflecting field derived therefrom is modified to produce a substantially uniform

rate of movement of said electron beam over said scanned member in at least one direction.

According to a further feature of the present invention there is provided a circuit arrangement for deflecting and focussing the electron beam of a cathode ray tube comprising a thermionic valve having its anode and cathode coupled together through a transformer so that sawtooth deflecting fields may be derived therefrom, said valve having included in its grid circuit a resistive electro-magnetic winding so disposed in relation to a further magnetic winding for focussing the electron beam of the said cathode ray tube as to modify the field produced by said further winding, the resistance of first said winding being such that the sawtooth deflecting fields derived from said valve are modified to deflect the electron beam within said cathode ray tube at a substantially constant speed in at least one direction over a scanned member inclined to the undeflected position of the said cathode ray and the relation of first said winding to second said winding being such that the said cathode ray is maintained substantially focussed upon said scanned member in all positions.

According to another feature of the present invention there is provided a circuit arrangement for deflecting and focussing the electron beam in a cathode ray tube comprising a thermionic valve having its anode and grid circuits coupled by means of a transformer so that sawtooth deflecting fields may be derived therefrom in which there is connected effectively in parallel with a portion of a winding of said transformer an electro-magnetic coil so disposed in relation to a further electro-magnetic coil for focussing said electron beam that said beam is maintained substantially focussed upon a scanned member which is inclined to the undeflected position of said beam and said first electro-magnetic winding being such as to modify the inductance of the winding across a portion of which it is connected in such manner that said beam is deflected at a substantially uniform speed across said scanned member.

In order that the present invention may be more particularly described, reference is now made to the diagrammatic drawing accompanying this specification, of which:

Figure 1 is a diagrammatic representation of one circuit according to the present invention;

Figure 2 is a diagrammatic representation of another circuit according to the present invention;

Figure 3 is a diagram showing the arrange-

ment of focussing and deflecting coils of a cathode ray tube, and

Figure 4 shows a detail of the arrangement of Figure 3.

5 The circuit shown in Figure 1 comprises a thermionic valve 1 having its anode connected through one winding 3 of a transformer 2 to an appropriate source of high tension potential. The grid of the valve is connected through the
10 other winding 4 of the transformer 2 and through a further electro-magnetic coil 5 to earth. The cathode of the valve is connected through a parallel resistance condenser combination 6 to earth. The winding 5 is disposed adjacent to a
15 focussing coil 7 through which an appropriate direct current is passed. The coils 5 and 7 surround the beam path of a cathode ray tube and serve to focus the electron beam upon a scanned member 12 within the tube which is inclined to
20 the undeflected position of the beam. The number of turns and the sense of connection of the winding 5 are chosen so that the focussing field produced by the coil 7 is modified to maintain the electron beam focussed upon the scanned
25 member at all positions while the resistance of the winding 5 is chosen such as to modify the deflecting field derived from the oscillating valve 1 so that the electron beam is deflected over the inclined scanned member at a constant speed.
30 The deflecting fields may be derived from the valve 1 by connecting deflecting coils between the grid of the valve and earth through an appropriate condenser or the iron core of the transformer 2 may also serve as a deflecting yoke as described in British Patent Specification No. 463,972.

Referring to Figures 3 and 4, the cathode ray tube is indicated at 10 having an electron gun 11 and a screen 12 inclined to the undeflected position of the beam indicated by the line 13. The
40 deflecting coils 3 and 4 are mounted on a transformer core 14 constructed as a yoke embracing the tube. These coils are connected to the valve 1 as described with reference to Figure 1. The
45 auxiliary focussing coil 5 embraces the tube and is mounted within the normal focussing coil 7 which is energised from a battery 15. The field provided by the coil 5 which is connected in circuit with the valve 1 modifies the focussing effect
50 of the coil 7 to maintain the beam focussed on the screen. There is also produced an alteration in the sawtooth waveform of the current energising the deflecting coils 3 and 4, causing the beam to be deflected linearly with time over
55 the inclined screen 12. The high-frequency scanning coils are diagrammatically indicated at 16.

In one practical case it was found that 2,000 ampere turns were necessary to focus the electron beam of a cathode ray tube upon the end
60 of the scanned member nearest the electron gun while 2,100 ampere turns were necessary to focus the electron beam upon the edge of the scanned member furthest from the gun. In this case
65 therefore the number of turns of the winding 5 was chosen such as to produce a maximum of 100 ampere turns.

The coil 5 may conveniently be wound upon a former smaller than that on which the main
70 focussing coil 7 is wound so that it may be placed within the coil 7.

In Figure 2 in which the same references are used to denote parts similar to those of Figure 1,

the auxiliary coil 5, which need no longer be of high resistance, is connected in parallel with a portion of the grid winding 4 of the transformer 2 through a condenser 8. The correction of the focussing field is obtained in exactly similar manner to that obtained in the embodiment shown in Figure 1 but the variation of deflecting field is obtained owing to the effective reduction of the inductance of the winding 4 of the transformer 2 which is found to give an appropriate
10 alteration of the shape of the deflecting field when the inductance of the winding 5 is correctly chosen.

The embodiment shown in Figure 2 may be modified by connecting the coil 5 in parallel with
15 a portion of the anode winding 3 of the transformer.

I claim:

1. For a cathode ray tube having a scanned member inclined to the undeflected position of the electronic beam, deflecting and focussing means for the beam comprising a thermionic valve, grid and anode circuits for said valve, a transformer coupling said grid and anode circuits and providing a sawtoothed deflecting field
25 for said beam, an electro-magnetic coil for focussing said electronic beam and a resistive electro-magnetic coil connected in said grid circuit for modifying the focussing of the beam effected by said focussing coil to maintain the beam substantially focussed in all positions upon the scanned member, and modifying the said
30 deflecting field to produce substantially a uniform rate of movement of the beam over said scanned member in at least one direction.

2. For a cathode ray tube having a scanned member inclined to the undeflected position of the electronic beam, deflecting and focussing means for the beam comprising a thermionic valve, grid and anode circuits for said valve, a transformer coupling said grid and anode circuits and providing a sawtoothed deflecting field
40 for said beam, an electro-magnetic coil for focussing said electronic beam and an auxiliary electro-magnetic coil connected effectively in parallel with a portion of a winding of said transformer for modifying the focussing of the beam effected by said focussing coil to maintain the beam substantially focussed in all positions upon the scanned member, and modifying the deflecting field to produce substantially a uniform rate
50 of movement of the beam over said scanned member in at least one direction.

3. A circuit arrangement for deflecting and focussing the electron beam in a cathode ray tube on to a scanned member which is inclined to the undeflected position of the beam, comprising a thermionic valve, grid and anode circuits for said valve, a transformer coupling said circuits and providing sawtoothed deflecting fields for said beam, an electromagnetic coil connected effectively in parallel with a portion of a winding of said transformer, a further electro-magnetic coil for focussing said electron beam, said coils being so disposed relatively to one another as to maintain the beam substantially focussed upon said scanned member and the first said electro-magnetic coil being such as to modify the inductance of the winding in parallel with a portion of which it is connected in such manner
70 that the said beam is deflected at a substantially uniform speed across said scanned member.

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