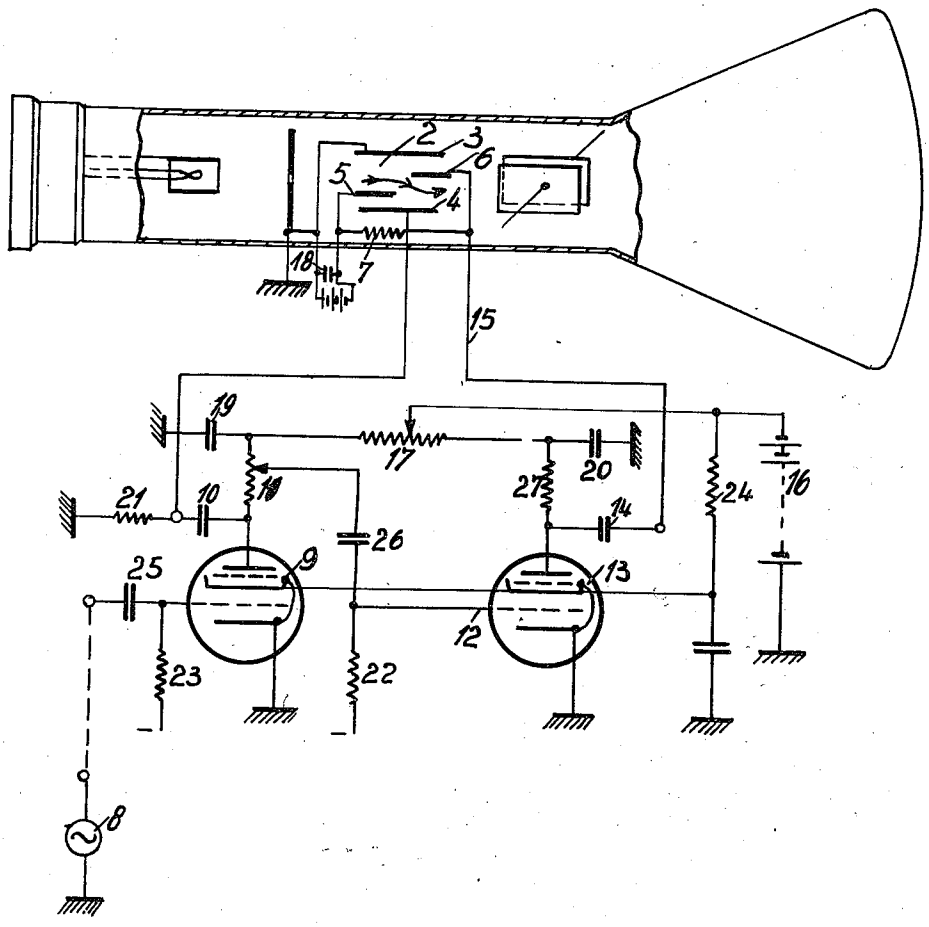
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CATHODE RAY DEFLECTING CIRCUIT

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CATHODE RAY DEFLECTING CIRCUIT

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3 Claims. (Cl. 250—27)

In the co-pending application Serial No. 694,915, filed October 23, 1933, Patent No. 2,083,204, dated June 8, 1937, a Braun tube for television purposes has been described, the deflecting systems of which consist of three plates each. In this arrangement the cathode ray enters the space between the upper and the middle plate, is then bent through a slot provided in the positively biased middle plate into the space between the middle plate and the lower plate, and then leaves this space, in the state of rest, parallel to the direction of its entry into the system. After being bent into the space between the middle plate and the lower plate, the cathode ray undergoes scanning deflections in this latter space. In this arrangement the middle plate is maintained at a constant potential, whilst the full scanning deflection potential is applied to the lower deflecting plate. In this arrangement considerable potentials (of the order of about 400 volts) are required for a complete modulation.

The object of the invention is an additional development of the arrangement described in the co-pending application referred to, which makes it possible to operate with considerably lower scanning potentials.

According to the invention, the middle plate is divided into two completely independent parts, both of which have the same D. C. potential (positive in relation to the two outer plates). The scanning potential is supplied simultaneously and in phase opposition to the one outer plate and to the part of the middle plate directed towards the luminous screen.

In this manner it is possible to perform full-range control with half the potential otherwise required.

A form of embodiment of the invention is illustrated by way of example in the single figure of the drawing.

Herein 1 is the anode of the Braun tube, 2 a deflecting plates system with the two outer plates 3 and 4 and the inner plate comprising the two parts 5 and 6. The plates 3 and 4 are maintained at anode (earth) potential as regards D. C. conditions, whilst the middle plate is positively biased to such extent in relation to the plates 3 and 4 that the ray entering the space between the plates 3 and 5 is bent into the space between the plates 4 and 6, and emerges from this space in its state of rest parallel to the direction of its entry but displaced in relation thereto to the extent of a few millimetres. The plates 5 and 6 are connected with each other over a high ohmic resistance 7 of about 10^6 ohms and are accordingly maintained at equal potentials, as regards D. C. conditions whilst as regards alternating current conditions the same possess different potentials.

The deflecting potential provided by the generator 8 is amplified in the amplifier tube 9, preferably a pentode, and then applied to the lower deflecting plate 4 over a condenser 10. The control grid 12 of the phase-reversing tube 13, which preferably is also in the form of a pentode, is connected with the anode resistance 11 of the pentode 9. The deflecting potential of reverse phase thus produced is applied over the condenser 14 and the line 15 to the plate 6. The tap at the anode resistance 11 is so selected that the deflecting potentials of reverse phase taken from the two pentodes have equal amplitudes. The anode potential for both pentodes is taken from the same potential source 16 and is applied to the pentodes over the potentiometer 17. Since the alternating potentials occurring in the anode circuits of the two pentodes are in this manner caused completely to compensate each other, it is rendered possible by the arrangement according to the invention to reduce to a minimum, or possibly even omit entirely, special steadying means otherwise always necessary in the anode circuit.

The condenser 18 may be selected at .5 mf., the condensers 19 and 20 each at 1 mf. the resistances 21, 22, 23 at .1 megohm, the parts of the resistance 17 at the two sides of the tap each at 5000 ohms, the resistance 24 at 25,000 ohms, and the resistance 7 at .1 megohm. The resistance 7 should preferably always be small in relation to the working resistance.

The arrangement according to the invention is for use both in the line frequency deflection as well as the frame frequency deflection portions.

For the line-frequency deflection portion the condensers 25, 26 and 14 should each be selected at 1000 cm., and the two anode resistances each at 20,000 ohms.

From the frame-frequency deflection portion the condensers 25, 26 and 14 may be selected preferably each at .1 mf., and the anode resistances 11 and 27 each at .1 megohm. The position of the tapping point, as already stated, is determined by the amplification of the pentodes in respect of the different frequencies, and is always selected to be such that the deflecting potentials possess the same amplitude.

Variations of the above dimensions cited as

examples are of course possible without departing from the prinicple of the invention.

Since the frame frequency deflection portion permits of better amplification than the line frequency deflection portion (approximately 100:20), it is necessary, more particularly in those cases in which the complete raster is transmitted by wireless, to modulate the raster transmitter accordingly.

It is also possible to impart different direct potentials to the plates 5 and 6, and in this manner to accomplish that the ray in the state of rest emerges from the space between the plates 6 and 4 displaced at any desired angle in relation to its direction of entry. In this manner it is possible to avoid the displacement otherwise occurring when using the system according to the invention, and to accomplish that the ray meets exactly against the centre of the image screen when in the state of rest.

I claim:

1. Connection device for operating the electrostatic deflecting system of a Braun tube comprising two outer plates and two middle plates, said device consisting of a circuit comprising means for producing an alternating voltage, an amplifier tube having a cathode, an anode, and a control grid, means for applying said alternating voltage to said control grid, a first anode resistance having one of its ends directly connected to said anode, so that an alternating potential may be taken from this end, a tap on said anode resistance, a phase-reversing tube having a cathode, an anode, and a control grid, means for coupling the control grid of said phase-reversing tube to said tap, a second anode resistance having one of its ends directly connected to the anode of said phase reversing tube so that a further alternating potential reversed in phase with respect to the first said alternating potential may be taken from the last mentioned end, means for adjusting said tap to make the amplitude of the second said alternating potential relative to a fixed potential equal to the amplitude of the first said alternating potential relatively to the same said fixed potential.

2. Circuit comprising means for producing an alternating scanning potential relative to a fixed potential, means for producing in relation to the same fixed potential a further alternating potential equal in amplitude to said scanning potential but reversed in phase with respect to said scanning potential, means to apply one of said two alternating potentials to one of said outer plates, and means to apply the other one of said two alternating potentials to one of said middle plates, a circuit comprising means for producing an alternating voltage, an amplifier tube having a cathode, an anode, and a control grid, means for applying said alternating voltage to said control grid, a first anode resistance having one of its ends directly connected to said anode, so that an alternating potential may be taken from this end, a tap on said anode resistance, a phase-reversing tube having a cathode, an anode, and a control grid, means for coupling the control grid of said phase-reversing tube to said tap, a second anode resistance having one of its ends directly connected to the anode of said phase reversing tube so that a further alternating potential reversed in phase with respect to the first said alternating potential may be taken from the last mentioned end, a common anode voltage source for supplying the anodes of both said amplifier and phase reversing tubes with anode voltages, a common resistance having one of its ends connected to the said first anode resistance and its other end to said second anode resistance, a point of said common resistance intermediate of its ends being connected to the positive end of said anode voltage source, the cathode of said amplifier and phase-reversing tubes being maintained at the potential of the negative end of said anode voltage source, means for adjusting said tap to make the amplitude of the second alternating potential relatively to a fixed potential equal to the amplitude of the first said alternating potential relatively to the same said fixed potential, means for coupling one of said alternating potentials to one of said outer plates and means for coupling the other one of said alternating potentials to one of said middle plates.

3. The invention as claimed in claim 1, including means for adjusting said intermediate point of said common resistance to cause the alternating anode voltages to compensate each other in the anode feed line.

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