Nov. 17, 1942. F. WOERNER 2,302,161

ARRANGEMENT FOR ELECTRO-MAGNETIC DEFLECTION OF THE CATHODE RAY

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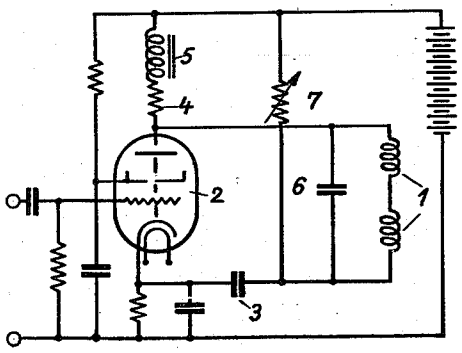


Fig. 1

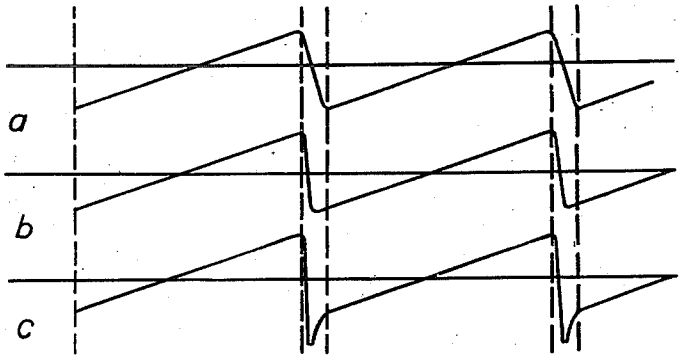


Fig. 2

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ARRANGEMENT FOR ELECTROMAGNETIC DEFLECTION OF CATHODE RAYS

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1 Claim. (Cl. 250—27)

The present invention relates to arrangements comprising a cathode ray tube having at least one electromagnetic coil for deflecting the cathode ray in said tube as used for television purposes. Such an arrangement comprises an oscillator which produces a current for deflecting the cathode ray. The deflecting current is a so-called saw-tooth current having a large part for scanning or forming the picture and a small part for returning the cathode ray. The so-called return period should be very short.

That may be accomplished by using a choke having inherent distributed capacity connected in the anode circuit of an amplifier for amplifying the deflecting currents and a condenser connected in parallel to the coil for deflecting the cathode ray. The natural oscillation periods of the choke and the parallel connected coil and condenser shall be the required return time.

The invention is shown in Figs. 1 and 2.

Fig. 1 shows the arrangement according to the invention.

Fig. 2 shows a diagram of curves of the saw-tooth current in view of the invention.

Referring to Fig. 1, a deflecting coil 1 is connected across the anode and cathode of the amplifier tube 2. The tube 2 amplifies the deflecting oscillations applied across the grid and the cathode. The anode of the tube 2 is connected via the anode resistance 4 to a potential source. The condenser 3 is connected in series to the deflecting coil 1 for preventing the flowing of the direct current through the coil.

Upon the reason of the transmission of power of the impedance of the coils 1 the dimension of the anode resistance must be adapted in such fashion that for the basic frequency the impedance of the coils 1 is nearly equal to the impedance of the anode resistance. In practice a low-ohmic resistance 4 is sufficient (few thousand ohms for the frame deflection circuit) since the numbers of windings of the deflecting coils cannot obtain any high dimension, because its natural resonance must be higher than the basic frequency. The obtained return time is approximately 10 per cent of the basic period.

According to the invention for purposes of increasing the return velocity a choke of the natural period of which is nearly the period of the required return time. In this manner it is possible to obtain a return time of 3 per cent of the basic frequency for the frame deflection. That may be accomplished by using a suitable choke.

A further or additional way for increasing the return velocity at approximately 1 per cent may be obtained by connecting a condenser 6 in parallel, the capacity of which is so dimensioned that the natural frequency of the circuit 1, 6 being nearly the required short return frequency.

Fig. 2 shows the effects resulting from the described methods.

There the curve *a* represents the oscillation obtained without the improvements according to the invention. The curve *b* represents the saw-tooth oscillation by the use of a choke 5 tuned according to the invention, which is connected in the anode circuit of the amplifier 2 and has such an inherent distributed capacity in relation to its inductance that its natural oscillation period is the required return time. The curve *c* represents the oscillation produced by means of the condenser 6 in parallel to the coil and of a choke connected in the anode circuit of the tube 2.

The condenser blocking the direct current should have an impedance which is low as regarded with impedance of the deflecting coils for purposes of preventing distortions of the current wave form. For low relaxation frequency capacities of 10–20μf. are sufficient. Commercial condensers having such a capacity are preferably electrolytic condensers. In television relaxation oscillators the leakance current of electrolytic condensers which is much higher than of paper roll type condensers effects a displacement of the image on the screen of the cathode ray tube. This leakance current flows also through the deflecting coils and deflects the cathode ray continuously for a constant value. According to the invention this undesirable effect may be avoided by a current being equal but opposite flowing through the coils by way of connecting the negative end of the coils 1 through a variable resistance of about 0.1 to 0.5 megohm to the positive terminal of the anode battery. The anode resistance 4, the tube 2, the leakance resistance 8, the tunable resistance 7, and the coils 1 are formed as direct current bridge which is so adjusted that the diagonal of the coils is without current.

I claim:

An arrangement comprising a cathode ray tube having at least one electromagnetic coil for deflecting the cathode ray in said tube, an oscillator for supplying a saw-tooth deflecting current having a predetermined return time, means comprising an amplifier tube for applying said current across said coil, a choke having inherent distributed capacity connected in the anode circuit of said amplifier and a condenser connected in parallel to said electromagnet coil, the natural oscillation periods of said choke and said parallel connected coil and condenser being the required return time of said deflecting current.

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