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R. URTEL

2,202,612

ELECTRON BEAM CONTROL SYSTEM

Filed May 21, 1936

Fig. 1a

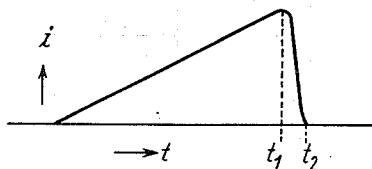


Fig. 1b

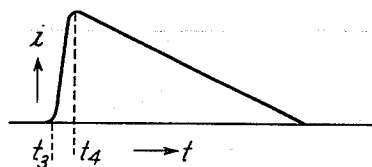


Fig. 2a

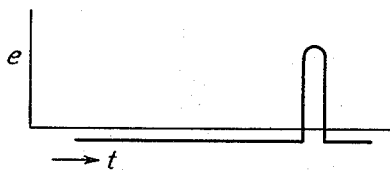


Fig. 2b

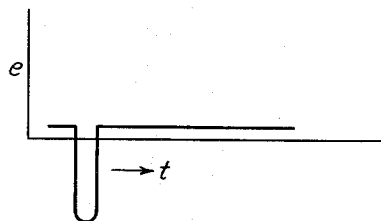


Fig. 3a

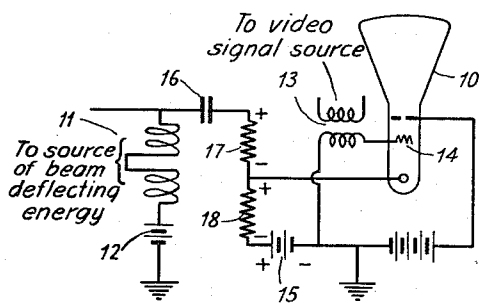
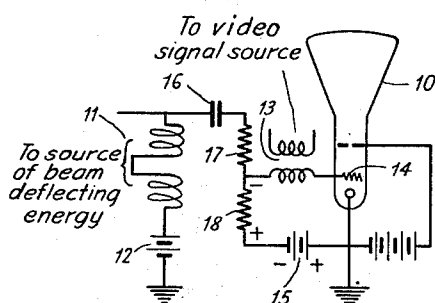


Fig. 3b



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ELECTRON BEAM CONTROL SYSTEM

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2 Claims. (Cl. 178—7.5)

The present invention relates to deflecting systems for controlling the movement of an electronic ray, pencil or beam developed, for example, in a cathode ray or so-called Braun tube or in a related type of electronic device.

It is known that cathode ray tubes which are to be used as television receivers, after completion of each scanning line and after the completion of scanning each frame of the image, are blocked for the duration of the line or picture impulse in order that the deflector circuit in question may have a chance to be restored to the initial state required for the transmission of the following line or the following frame of the image. It has been suggested also to make this blocking action a function of the restoring process of the receiver circuit in question. This has been accomplished by the aid of an auxiliary coil which was in coupling relation with the deflector coil, and whose voltage was utilized by way of an auxiliary amplifier for acting upon the picture amplifier. Quite apart from the fact that such an amplifier may entirely be dispensed with, as shall be shown by the invention hereinafter to be disclosed, it may under certain circumstances also be causative of disturbances which in all likelihood are associated with building-up phenomena in the amplifier.

In what follows a circuit arrangement operating without an auxiliary amplifier is suggested for the blocking of the cathode-ray pencil as a function of the restoring action in the deflector circuit in the receiver. The invention in one of its preferred forms provides for a voltage divider by way of a condenser with the tube deflection coils, so that part of the potential acts in the circuit serving for the brightness control of the Braun tube. The blocking is to take place after completion of each line and after completion of each picture or frame, or, in the so-called "interlaced-line" method of scanning, after completion of each series of lines.

A number of exemplified embodiments of the invention shall be described in what follows by reference to the annexed drawing wherein:

Figs. 1a and 1b show the time-shape of the current in the deflector coils of a cathode ray tube, Fig. 1a being concerned with the case where the cathode ray pencil is deflected by a coil current presenting a linear rise, while Fig. 1b is to illustrate the case where the cathode ray pencil or beam is deflected by a linearly declining coil current;

Figs. 2a and 2b represent the voltages across the deflecting coils of the cathode ray tube for

the conditions shown by Figs. 1a and 1b respectively; and Figs. 3a and 3b represent the circuits corresponding to Figs. 1a, 2a and 1b, 2b.

Referring now to the drawing and first to Figs. 1a and 1b thereof, it will be seen that within the interval between t_1 and t_2 , in Fig. 1a, and inside the interval between t_3 and t_4 , Fig. 1b which corresponds to the intermission of line, frame or line series, the current changes in the coils with comparatively great rapidity, and the deflector circuit in question is restored to its original state. The voltage across the deflector coil has a shape during these periods as illustrated in Figs. 2a and 2b. The same is constant during its linear rise, and it has during the rapid return (flyback) time t_1 , t_2 and t_3 , t_4 , a positive and a negative peak, respectively is developed across the coils.

The corresponding circuit arrangements are shown in Figs. 3a and 3b as above stated. Reference may be made now to Figs. 3a and 3b where numeral 10 denotes the cathode ray tubes, 11 the coil pairs, and 12 the D. C. sources which furnish the deflector currents. The parts of the circuit organization which serve to produce the linearly rising or linearly decaying coil current have been omitted in Figs. 3a and 3b for simplicity, but are well known in the art. Such forms of devices are, however, well known in the art and are illustrated for example by British Patents 395,499; 401,990; 402,629 and 403,283 as well as other prior art. By means of suitable transformers 13 whose primary windings connect with a suitable signal source, the control electrodes 14 of the cathode tubes coupled to the secondaries of the transformers 13 are energized with the image or video signals. The control electrodes 14 have supplied thereon a constant biasing potential from the D. C. sources 15. Connected with coils 11, by way of condenser 16, are voltage dividers which comprise resistance elements 17 and 18. In the case of Fig. 3a, in the time interval between t_1 and t_2 a fall of voltage occurs across the resistances 17 and 18 the direction of which is indicated by plus and minus signs. This fall of potential causes a shift in the potential of the control electrode 14 into the negative region so that the cathode-ray pencil is blocked until the deflector circuit has again been restored to its original state. During the time-linear rise in Fig. 1a, on the contrary, a constant drop of voltage of opposite sign occurs across the resistance 18, in other words, a positive voltage arises for the control electrode which will wholly or partly be compensated, or even be over-compensated, by the voltage 15.

In the circuit organization according to Fig. 3b, the fall of potential across resistance 18, during the time-interval t_3 , t_4 , which is also indicated by plus and minus sign, represents a negative potential for the electrode 14 and thus becomes added to the voltage of battery 15; during the linear drop of the current, on the contrary, the fall of potential across resistance 18 forms a positive biasing voltage for the electrode 14 which becomes subtracted from potential 15 and which may be lower or higher than, or equal to, this voltage.

Having now described the invention, what is claimed is:

1. In an electron beam deflecting system, an electron tube having means therein to develop an electron beam and an observation screen upon which the developed electron beam produces luminous effects, a pair of electromagnetic coils for deflecting the produced electron beam, a control electrode for controlling the intensity of the produced electron beam, means to supply video signals upon the control electrode to vary thereby the beam intensity, means to energize the beam deflecting coils, a series combination comprising a capacity element and a voltage divider, the capacity element of said series combination having one terminal thereof connected to one end of

the deflecting coils, and means for impressing the potential on the midpoint of the voltage divider directly onto said control electrode, said midpoint, said control electrode, and said means to supply video signals upon the control electrode being connected serially.

2. In an electron beam deflecting system, an electron tube having means therein to develop an electron beam and an observation screen upon which the developed electron beam produces luminous effects, a pair of electromagnetic coils for deflecting the produced electron beam, a control electrode for controlling the intensity of the produced electron beam, means to supply video signals upon the control electrode to vary thereby the beam intensity, means to energize the beam deflecting coils, a capacity element having one terminal thereof connected to one end of the deflecting coils, a resistance element in series with the capacity and connected to the other terminal thereof, a source of biasing voltage, a connection from the resistance element to said control electrode through said source of biasing voltage, and means for applying video signal impulses to the control electrode through said connection to said electrode from said resistance element.

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