

July 4, 1939.

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2,164,891

ELECTROMAGNETIC CATHODE RAY DEFLECTION APPARATUS

Filed Aug. 11, 1936

Fig. 1

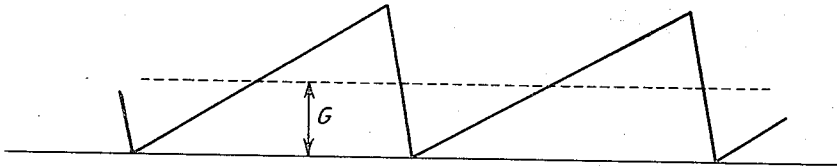


Fig. 2

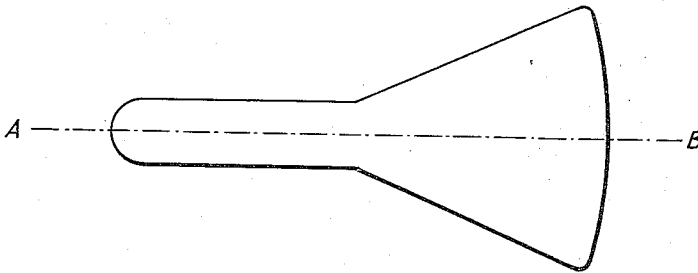
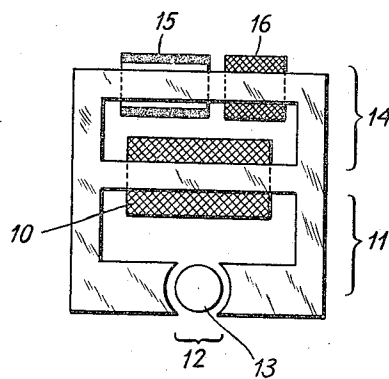


Fig. 3



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2,164,891

ELECTROMAGNETIC CATHODE RAY
DEFLECTION APPARATUS

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Application August 11, 1936, Serial No. 95,340
In Germany August 20, 1935

3 Claims. (Cl. 250-157)

My invention relates broadly to electro-magnetic apparatus for deflecting the electronic beam in a cathode ray tube and more particularly to an arrangement whereby the undesirable effects of the direct current component of the alternating current wave, which energizes the apparatus, are substantially obviated.

The present practice is to energize electro-magnetic deflecting means with a saw-tooth or serrated wave form for the purpose of effecting a linear displacement of the cathode ray beam in a cathode ray tube particularly when the apparatus is used for television purposes. This saw-tooth wave form, however, contains a direct current component which sets up a steady flux, the result of which is to undesirably effect an initial deflection of the cathode ray beam from the center point. Accordingly, it has been necessary in some way to compensate for the steady field produced by this direct current component.

An attempt has been made to produce this compensation in the ordinary iron core deflecting means by means of an additional winding arranged on the iron core through which a direct current was passed in order to set up a field in opposition to the field produced by the direct current component of the saw-tooth wave in the deflecting coils themselves. In this manner it was possible to compensate the constant flux portion produced by the saw-tooth current but there was the inherent disadvantage that the compensation winding had to be energized by a current source having a very high internal resistance. Therefore, in practice, the energizing was accomplished from an amplifier tube in order that the alternating flux produced by the alternating current component of the wave could be prevented from inducing alternating currents in the compensation winding.

It is, therefore, an object of this invention to produce an arrangement which permits compensation of the constant flux portion without the necessity of energizing the compensating winding from a current source of high internal resistance. To this end, I provide, in addition to the yoke, which contains the air gap in which is placed the cathode ray tube, a second iron or highly permeable yoke which is joined to the core arrangement about which the deflecting coil is wound, and on this second closed yoke a short-circuit winding is mounted. In this manner, the constant flux portion, through the air gap can be greatly reduced without the use of a compensating winding.

My invention will best be understood by reference to the drawing in which:

Figure 1 is a curve showing a serrated wave form and its direct current component.

Figure 2 is a cathode ray tube shape showing the centering axis, and

Figure 3 shows one embodiment of my invention.

Referring to Figure 1, a saw-tooth or serrated wave form, which is ordinarily used in either electro-magnetic or electro-static deflecting means, is illustrated. Such a wave will have a direct current component, as shown by the dotted line illustrated by the space G.

When such a shaped wave is used in conjunction with electro-magnetic deflecting means, the cathode ray, which in its position of rest would coincide with the axis AB of Figure 2, the effect will be that the ray would sweep only one-half of the absorption screen, that is, the luminescent screen in the case of a Braun tube. Consequently, the action of this direct current component should be eliminated and the electro-magnetic means, as set forth hereinafter and illustrated in Fig. 3, will accomplish the desired result.

Referring to Fig. 3, 10 represents the deflecting coil to which saw-tooth or serrated wave form is fed for the purpose of developing a flux in the core about which this inductive member is wound. Joined to the core of coil 10 is a closed yoke member 14 and wound on one arm of the closed yoke member is a short-circuiting winding 15. Also joined to the core about which the inductive member 10 is wound is an open yoke 11 containing therein an air gap 12 in which a cathode ray tube is adapted to be placed in order that the flux set up in this member may control or energize the deflection of the electron beam developed in the tube.

The magnetic flux produced by the coil 10 having a constant portion as well as a number of alternating components, will be distributed over the two yokes 11 and 14. The alternating flux passing over the yoke 14 induces in the short-circuited winding 15 a current which sets up a flux in opposition to the alternating flux by which it is produced, thus substantially eliminating the alternating current flux in this yoke. As a result, the alternating flux will be closed across the air gap 12 as desired. The constant flux will, however, due to the extreme permeability to the yoke 14, as compared to the yoke 11, contain the greater part of the constant flux set up by coil 10, since yoke 14 has no air gap.

Hence, the constant flux is virtually or substantially eliminated from the open yoke 11.

In cases in which it is desirable to eliminate all of the constant flux, a winding 16 is wound about an arm of the closed yoke 14, preferably not the arm which forms the core of coil 10. The direction of the current flowing in this winding is to be so chosen that the flux which it produces is in opposition to that of the constant flux produced by coil 10. In this manner, the constant flux in the air gap 12 can be completely eliminated. With this arrangement, it is not necessary to use a current supply of high internal resistance which has heretofore been necessary in compensation windings in electro-magnetic deflection apparatus, since in the yoke 14 practically no alternating flux appears. Thus, for instance, a television receiver of the Braun tube type may use this apparatus in conjunction with a battery eliminator for supplying current to the coil 16.

What I claim is:

1. In a cathode ray tube system, a cathode ray tube, means for developing an electron stream within said tube, a core member, inductive means wound on said core member adapted to be energized by an A. C. wave having a D. C. component, a closed yoke member joined to said core member, means cooperating with said yoke member for generating a flux in opposition to the flux produced by the D. C. component of the A. C. wave, and a second open yoke member joined to the core

member, said latter yoke member having an air gap therein which is adapted to allow the passage of the electron stream therethrough.

2. In a cathode ray tube system, a cathode ray tube, means for developing an electron stream within said tube, a core member, a coil wound about an arm of said core member, said coil being adapted to be energized by an alternating wave having a D. C. component, a closed yoke member joined to the aforementioned core arm member, a short-circuiting winding mounted on said yoke member, and a second yoke member joined to the core arm containing an air gap through which the electron stream may pass.

3. In a cathode ray tube system, a cathode ray tube, means for developing an electron stream within said tube, a core member, an inductive winding on said core member, means for energizing said inductive winding with an A. C. wave form having a direct current component, a closed yoke member joined to the aforementioned core member, a short-circuited winding wound about one arm of said closed yoke member, a second inductive winding to be energized from a source having a low inner resistance, said latter winding wound on said closed yoke member, and a second yoke member joined to the core, said second yoke member having an air gap therein adapted to allow the passage of the electron stream therethrough.

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