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TELEVISION ARRANGEMENT

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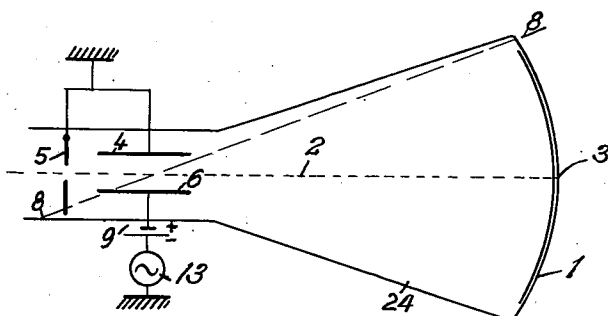


Fig. 1

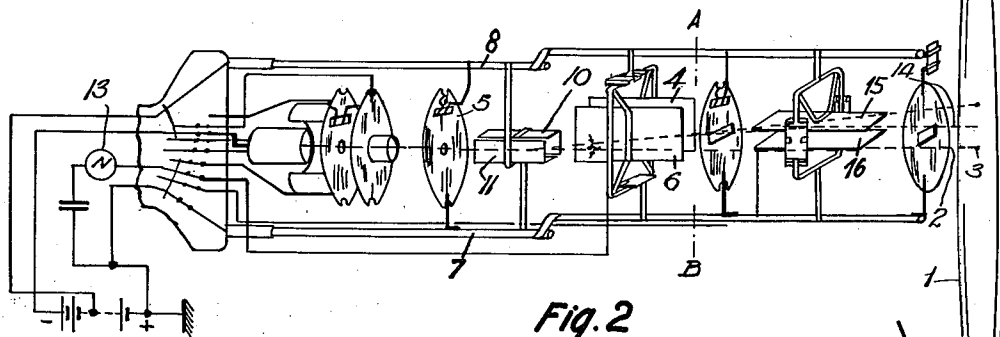


Fig. 2

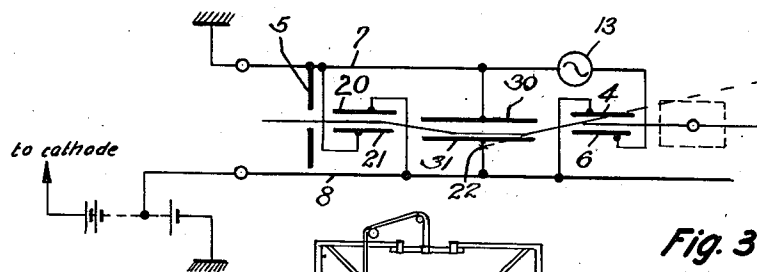


Fig. 3

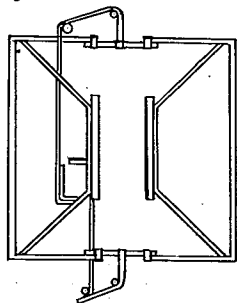


Fig. 4

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TELEVISION ARRANGEMENT

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Original application July 15, 1933, Serial No. 680,583, now Patent No. 2,053,537, dated September 8, 1936. Divided and this application July 7, 1936, Serial No. 89,446. In Germany July 19, 1932

3 Claims. (Cl. 250—27)

This invention relates to television arrangements including gas-filled Braun tubes, more particularly of the type described in the United States patent application Ser. No. 680,583, Patent No. 2,053,537, July 15, 1933 from which the present one has been divided out.

It is known that in the case of television images reproduced by gas-filled Braun tubes a light co-ordinate cross on a darker ground is always noticeable within the rectangular image field. This cross results from a decrease in the dissociation of the ions at the moment in which the strength of field between the deflecting plates passes through zero. At this moment the sensitiveness of the tube would appear to be somewhat diminished, the rate of deflection retarded, and accordingly the density of light increased in the two axial planes. This effect will be referred to in the following as centre point error.

It is known that this error in deflection may be overcome by causing the ray always to be curved in the plate space, i. e., by avoiding the point $E_p=0$ entirely.

Fig. 1 illustrates one known method of correcting centre point error.

Fig. 2 shows one embodiment according to the invention.

Fig. 3 illustrates another embodiment of the invention.

Fig. 4 shows a front view of Fig. 2 in a section through line A—B.

Fig. 1 illustrates the conditions. The centre point of the image field on the luminous screen 1 of the cathode ray tube 24 is taken to be the point 3. Normally the one plate 4 is passed together with the anode 5 on common potential to earth, and to the other plate 6 there is passed the potential of the A. C. generator 7, with special form of curve, causing the scanning of the image. The centre point of the image is now distinguished by the fact that in the case thereof the ray runs in a straight line from the anode to the screen, i. e., is not bent. Here the centre point error takes place.

Now it is obvious and is known that fundamentally this error may be avoided by the fact that a straight path of the ray is omitted entirely, and the ray enters the plate space in inclined fashion, as indicated by the dotted line 8. In this connection its inclination is such that if it were to proceed in a straight line the same, as shown, would be situated outside of the field of image. In this method, therefore, an additional bias—the battery 9 in Fig. 1—will require to be

connected in series with the deflecting potential 7, which deflects the ray to such extent that the same again falls on the centre point 3 of the luminous screen when the alternating potential of 7 passes through 9.

A method has become known in which the oblique entry of the ray into the plate space is accomplished by the fact that the neck of the tube together with the entire ray-generating system and the anode 5 are furnished with a correspondingly inclined position. This method, however, possesses appreciable disadvantages in the manufacture. The angle of deviation of the neck of the tube must be performed very accurately. The production of the tubes in machines is very difficult if the tubes do not have straight axes, the application of the plates to a common foot of the system is difficult, etc.

The subject matter of the invention refers to television tubes, which are free from the centre point error, and which operate fundamentally with inclined entry of the ray into the plate space, but which are, with the use of special arrangements for the preliminary electrical deflection of the ray, so constructed that the axis of the tube remains straight and the entire system central. Additional subject matter of the invention beyond this is constituted by tubes, in which the dimensioning of the systems for bending the ray is so performed that one single potential, and accordingly one single lead, is sufficient for reliably producing the correct passage of the ray in all bending fields.

The illustration of a simple embodiment of the invention is given in Fig. 2. This system is straight-sighted, but displaced parallel to itself. The ray leaves the anode diaphragm 5 vertically to the plane of the anode. Its normal path would be the axis 2 of the tube to the screen 1, which it would strike at its actual centre point 3. According, however, to the invention, there is provided behind the anode aperture a peculiarly constructed box system 10, 11 consisting of two angles. The angle 10 of this system is connected up with the same lead as the anode, i. e., in practice to earth. The lead is designated 7, and the connection between 10 and 7 is shown in Fig. 2. The angle 11 of the box system is connected to a bar 8, which possesses a negative potential as compared with the anode bar 7. In consequence the ray will be deflected in space to the extent of the angle α relatively to the undisturbed axis 2. The deflection α is of such extent that the ray would now just strike the upper right hand edge of the

image (as viewed by the observer during use), if no additional forces were to act on the same. The displacement of the point where the ray hits the screen must be imagined substantially larger than indicated in Fig. 2, wherein the screen 1 is, for reasons of available space, shown very much approached towards the electrode system, as compared with the real conditions. With this critical inclination, the extent of which is adjustable by the potential at 8, the ray enters the actual deflection plate space 4 and 6, of which a frontal view at A—B is shown in Fig. 4. The plate 6, as usual, is conducted outwards (preferably through the common foot of the tube to a terminal, with which there is connected on the outside the generator 13, which takes care of the line deflection and is always dynamically earthed). On an average, therefore, the plate 6 possesses the potential of the anode bar 7. It is accordingly necessary at the plate 4, which is situated opposite thereto, to apply in turn a potential which is negatively charged in relation to the anode, and similarly to apply to the plate 15 a negative potential relatively to the anode, so that the ray will be bent back into its old axial direction 14 and, although with a certain displacement parallel to itself, will again approach the centre point of the luminous screen. According to the invention, the deflection sensitivities of the particular co-ordinates of the box-system 10, 11 and the main deflecting system 4, 6 or 15 16 are selected to be equal to each other. In this case the plate 4 may be connected with the bar 8 in direct fashion, and it is accomplished automatically that the ray again returns to the correct axial position. If the potential at 8 is varied, viz., proceeding from earth potential to a value of approximately -200 volts, there is accordingly not to be observed on the stationary image point 3 anything beyond a slight displacement amounting to perhaps 5-6 mm. in the direction of the one corner of the image. If on the other hand the ray is allowed to pass over the television image screen, there is to be observed upon application of the same measure (variation of the potential 8) that the disturbing light cross of the centre point error moves continuously towards one corner of the image, and finally passes beyond the edge of the picture. In this manner the desired effect of rectifying the error has been obtained without varying the sensitiveness of the tube. Merely the image screen has been displaced parallel to itself to the extent of a few millimetres.

This disadvantage may be avoided by using the form of embodiment of the invention illustrated by way of example in Fig. 3, with two bending condensers and bending of the ray on several occasions. In a co-ordinate—the application to the space will be readily understood—there is shown in Fig. 3 the main anode 5 of the tube, followed by a cross-section through a first box system with the plates 20 and 21. The plate 21 is connected with the anode potential bar 7, and the plate 20 on the other hand with a bar 8 having the bending potential, i. e., with a potential of, for example, -100 volts, which is somewhat negative as compared with the anode and otherwise incapable of regulation. In consequence the ray traverses a parabola with a deflecting angle α in the same manner as if it had proceeded in a straight line from the centre of the plate system 20, 21 at the angle in question. According now to the invention, there fol-

lows on the system 20, 21 a system 30, 31 of plates, possibly of the same dimensions, but twice as long and having reversed polarity. In view of the doubled ratio $1/d$ it is accordingly possible to accomplish in the system 30, 31 that the ray reverses its direction in relation to the axis of the tube. The same now behaves in such fashion as if it proceeded from a virtual source of emission 22 outside of the tube axis, and by varying the potential at 8 it is possible to accomplish that this virtual source is situated more or less eccentrically to the tube axis. As already stated above, the potential at 8 is again adjusted in such fashion that continuation of the new path from 22 in a straight line would be situated just outside the corner of the image. With this inclination the ray enters the actual plate space 4, 6, and if in accordance with the invention the sensitiveness of all condenser fields is adjusted to be the same, it may be accomplished by earthing 6 over the deflecting generator 13, and by connection of 4 with 8, that the ray leaves the entire system with an axis of movement incidental to that axis of the tube, so that upon the adjustment of the bending potential at 8 there is no change at all in the position of the centre point of the image on the screen, whilst at the same time the error cross departs from the field of image.

Owing to the different distances of the deflecting plates from the anode in the case of series connected condensers, the box condensers must also be spaced differently in the two co-ordinates, i. e., their cross-sections are not squares, but right angles. Details of this nature, however, do not vary in any way the basic idea of the invention as described, this also applying to an equal extent to the fact that in complicated fashion it is naturally also possible to employ bending systems of different sensitivities if on the other hand for this purpose a corresponding number of different D. C. bending potentials are generated and supplied. It may be particularly pointed out that all results obtained with electrical bending fields may also be accomplished without difficulty with the assistance of magnetic bending fields. It is possible by means of coils placed inclinedly against the image co-ordinates and arranged either inside or outside the tube to produce magnetic transverse fields, which cause the passage of the ray as described, and it is also readily possible, for example by winding and subsequent excitation with the same current, to fulfill the condition that the amounts of the successive bends again result in the direction of the axis.

I claim:

1. In a television reception arrangement in combination a cathode ray tube comprising a straight evacuated envelope, a gas-filling inside said envelope, a cathode and an anode arranged in operative relationship thereto for producing a cathode ray, means for concentrating the cathode ray, means for controlling the intensity of the cathode ray, a picture receiving screen, two pairs of deflecting plates for deflecting the cathode ray in two directions vertical to each other for scanning said picture receiving screen, two further pairs of deflecting plates arranged between said anode and the first said deflecting plates, and means for connecting one plate of each of said further deflecting plates systems with one plate of one of the first said deflecting plates systems; means to supply said anode with a high positive potential against said cathode; means to supply the mentioned plate of each of the first said

deflecting plates system with a high constant bias against said anode; and means to supply the other plate of the first said deflecting plates system with a deflecting voltage.

- 5 2. In a television reception arrangement in combination a cathode ray tube comprising a straight evacuated envelope, a gas-filling inside said envelope, a cathode and an anode arranged in operative relationship thereto for producing a
10 cathode ray, means for concentrating the cathode ray, means for controlling the intensity of the cathode ray, a picture receiving screen, two pairs of deflecting plates for deflecting the cathode ray in two directions vertical to each other for scanning said picture receiving screen, two further
15 pairs of deflecting plates arranged between said anode and the first said deflecting plates; means to supply said anode with a high positive potential against said cathode; means for supplying one plate of each of said further deflecting plates
20 systems with a constant bias against said anode; means to supply one plate of the first said deflecting plates systems with a deflecting voltage; and means to supply the other plate of each of

the first said deflecting plates systems with the same constant bias against said anode.

3. In a television reception arrangement in combination a cathode ray tube comprising a straight evacuated envelope, a gas-filling inside
5 said envelope, a cathode and an anode arranged in operative relationship thereto for producing a cathode ray, means for concentrating the cathode ray, means for controlling the intensity of the cathode ray, a picture receiving screen, two pairs
10 of deflecting plates for deflecting the cathode ray in two directions perpendicular to each other for scanning said picture receiving screen, two further pairs of deflecting plates arranged between said anode and the first said deflecting
15 plates; means to supply said anode with a high positive potential against said cathode; means for supplying one plate of each of said further deflecting plates systems with a constant bias against said anode; means to supply one plate of the
20 first said deflecting plates systems with a deflecting voltage; and means to supply to other plate of each of the first said deflecting plates systems with a constant bias against said anode.

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