

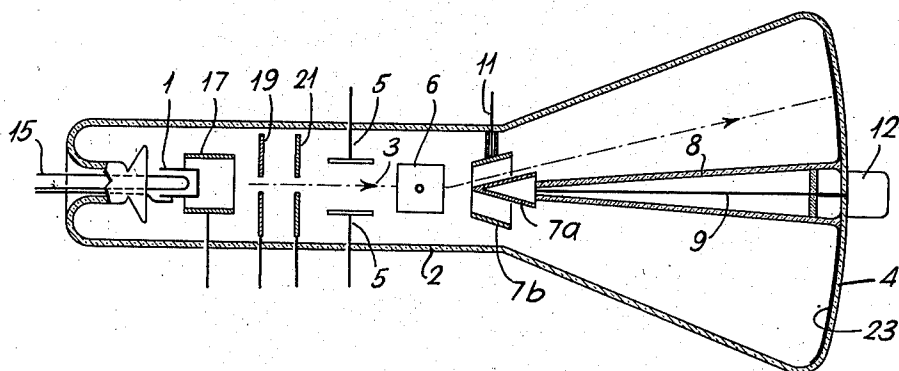
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ELECTRON DISCHARGE DEVICE

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ELECTRON DISCHARGE DEVICE

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This invention relates to electron discharge devices and more particularly to cathode ray tubes having an improved electrode system.

For certain purposes, in particular for measurements of short time periods it is known to cause the luminous spot in a cathode ray tube to perform a circular path through suitable deflection of the electron ray, whereby additional, radially directed deflection of the fluorescent spot is superposed for instance for reproducing indication marks. In this case, aside from the ordinary deflection system which may consist for instance of two plates or coil pairs, an additional deflection system for the radially directed deflection of the electron ray is employed. The latter suitably comprises concentric surfaces of revolution electrodes such as two conical or frusto-conical electrodes coaxially disposed with respect to the axis of the ray path, or cylindrical electrodes concentrically disposed with respect to this ray axis, and arranged within the cathode ray tube. The electron ray performing through its fluorescent spot on the screen of the tube a circular path passes through the annular space between the two electrodes. In the hitherto known arrangements of such a cathode ray tube it is found to be a disadvantage that the mounting arrangement and connection lead for the inner electrode of the additional deflection system cause shadow spots on the fluorescent screen of the tube thus interrupting the luminous image of the circular path. In accordance with the invention this drawback is eliminated in that the inner electrode of the additional deflection system is mounted on the wall of the screen of the tube within the circular track passed by the luminous spot.

An example of one embodiment of the invention is shown in the drawing.

Referring to the drawing, an electron gun, comprising a cathode 1, heated by a filament 15, a concentrating electrode 17, a focusing and modulating electrode 19 and anode 21, produces a beam of electrons which is projected normal to the cathode 1 toward the luminescent screen 23. Interposed between the electron gun and screen 23 are the deflecting electrode system 5—5, 6, and 7a, 7b. The deflection electrodes 5—5 and 6 are positioned mutually perpendicular to each and in register with the electron gun so that upon application of suitable potentials to the pairs of deflecting plates, the combined actions of the fields produce a circular trace upon the screen.

For this deflection magnetic fields also may be

employed. In the simplest way a rotary field is used for this deflection. In this case the two electrode pairs 5 and 6 have voltages applied that are displaced in phase by 90°. When employing a rotating field the electron ray describes during one cycle the same envelope of a circular cone. Accordingly, at symmetrical arrangement and construction of the fluorescent screen 23 the traced spot of the electron ray 3 moves along a circular line. After passing through the rotating field which affects the rotation of the cathode ray, the latter passes through the annular space between two coaxial cone-shaped or cylindrical electrodes 7a and 7b to which the voltage impulses are applied which cause the radial deflection of the electron ray. The inner deflection electrode 7a is mounted at a conical drawn-in part 8 of the wall 4 of the fluorescent screen. The entire supporting arrangement is situated within the cone-shaped envelope described by the rotating electron ray and hence is in the shadow of the beam. The outer electrode 7b as well as the connection at 11 can be mounted in the hitherto customary manner, since the mounting arrangement of this electrode likewise lies in the shadow. The connection 12 of the inner deflection electrode 7a is provided suitably across the connection line 9 preferably passed through the drawn-in part. In this way the formation of shadow parts due to the lead-in is likewise avoided.

Alternatively, the electrode 7a may be supported by stiff wire support members sealed into the end wall 4 of the tube envelope 2, which construction may be preferred to reduce the difficulties encountered in glass blowing of the first described form of invention. Where this form of supporting the inner conical electrode is used, the connection to the electrode may be effected by the same means described above, i. e., a lead wire 9, connected to the electrode 7a is sealed through the end wall 4.

Having described my invention, what I claim is:

1. A cathode ray tube comprising an envelope having an end wall completely closing said envelope, means for forming a beam of electrons supported from the envelope opposite to the end wall, a first electrode system for deflecting the beam in mutually perpendicular directions, a concentric electrode system for radially deflecting the beam, and means to support a part of the second electrode system from the end wall.

2. In a cathode ray tube having an end wall portion completely closing said tube, a radial deflecting system comprising concentric surface of

revolution electrodes, and means to support the inner concentric electrode from the end wall.

3. A cathode ray tube having an end wall portion completely closing said tube, an electron
5 gun supported from a press member opposite to the end wall portion axially aligned with a radial beam deflection system comprising two concentric conical surface electrodes, and means to support the inner concentric electrode from the end
10 wall.

4. A cathode ray tube comprising an envelope having a tubular portion, a conical portion and an end wall closing said envelope, an electron gun mounted within the tubular portion and supported therefrom opposite to the end wall, concentric
15 surfaces of revolution radial deflection electrodes within the conical portion of the envelope, means to support one of the radial deflection electrodes from the center of the end

wall, a luminescent screen supported on the end wall, and linear deflecting electrodes supported intermediate the electron gun and the radial deflection electrodes.

5. A cathode ray tube comprising an envelope
5 having a press member and an end wall closing said envelope opposite the press member, a source of electrons supported from the press member, means for focusing electrons from the source into a beam adjacent to the source, two pairs of
10 deflecting plates intermediate the end wall and the said means, each pair of plates being perpendicular to the other, and concentric radial deflecting electrodes intermediate the end wall and the said pairs of plates, one of said radial
15 deflecting electrodes being supported from the end wall.

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