May 30, 1939. M. PLOKE 2,160,672

IMAGE DISSECTOR TUBE

Filed Nov. 10, 1937

Fig. 1

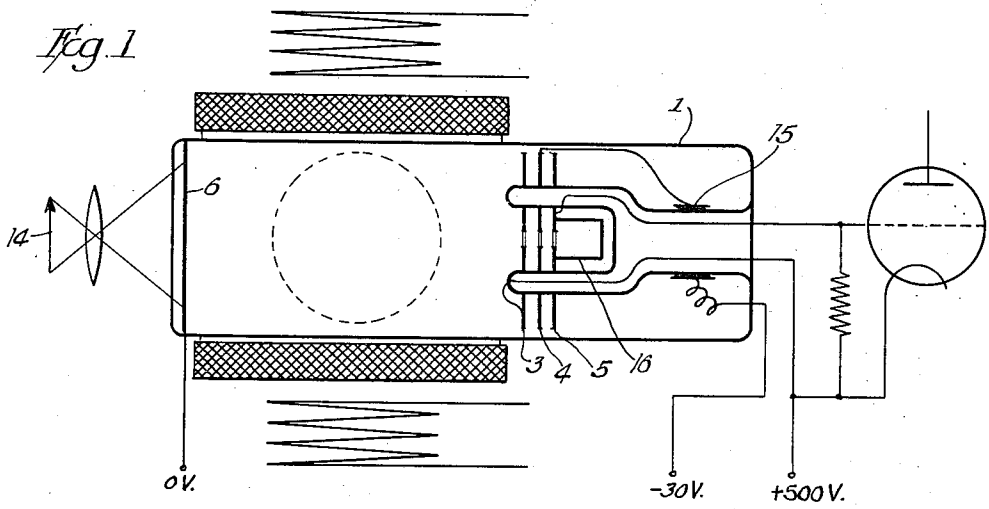


Fig. 3

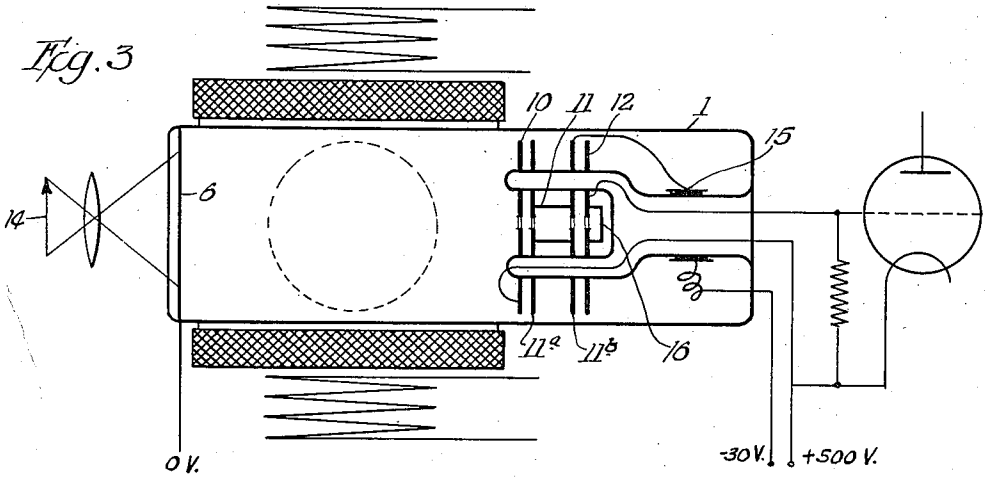
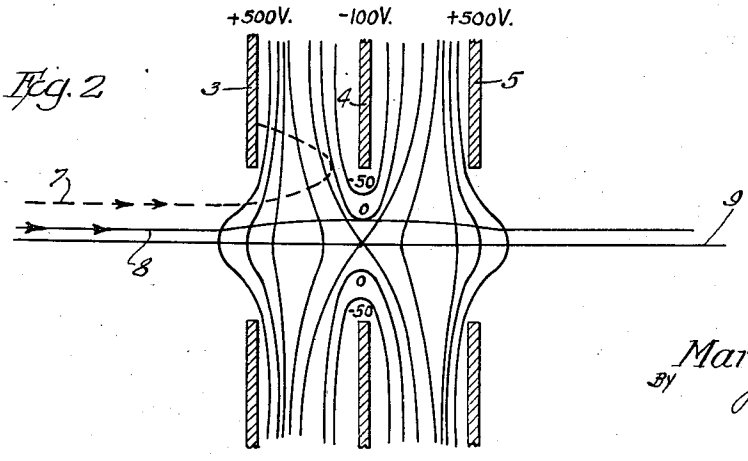


Fig. 2



Inventor
Martin Ploke
By B. Singer
Atty.

Patented May 30, 1939 2,160,672

UNITED STATES PATENT OFFICE

2,160,672

IMAGE DISSECTOR TUBE

Martin Ploke, Dresden, Germany, assignor to Zeiss Ikon Aktiengesellschaft, Dresden, Germany

Application November 10, 1937, Serial No. 173,895
In Germany November 13, 1936

3 Claims. (Cl. 250—153)

The invention relates to improvements in image dissector tubes, particularly adapted for television purposes.

The principal object of the invention is to provide an image dissector tube with means for varying electronoptically the effective size of the scanning aperture arranged in the anode of the dissector tube.

Heretofore the scanning aperture in the anode of an image dissector tube was produced mechanically so that the size of the image element when dissecting the electron image was permanently fixed. It is, however, sometimes of advantage and valuable to render the size of the image element variable, and in particular to reduce the same to a size which lies outside the range of mechanical production, for obviously there are limitations to the minute size to which a mechanically created opening can be reduced. The possibility of being able to vary the area of the image element, is valuble for instance in a case in which upon projection of a picture on the photo cathode it is necessary to adapt the size of the image element to the existing enlargement of the electron image produced by said projected picture.

The invention has the object of adjusting the size of the image element by employing in the image dissector tube an apertured anode in the form of an electric lens.

Another object of the invention is to employ as anode in said dissector tube an electric lens consisting of a plurality of apertured electrodes and to vary the effective area of the scanning aperture in said electric lens by varying the potentials applied to the individual apertured electrodes.

Other objects of the invention will be apparent from the following description, but it should be understood that the invention is not limited to the embodiments of the invention herein described, as various other forms may be adapted within the scope of the claims.

In the drawing:

Fig. 1 illustrates diagrammatically a longitudinal sectional fragments view of an image dissector tube.

Fig. 2 shows sectionally in an enlarged scale the center portion of the anode of the invention, and illustrates the distribution of the potentials and the passage of an electron beam through the aperture; and

Fig. 3 illustrates diagrammatically a modified embodiment of an image dissector tube in section.

Referring to Fig. 1, the envelope 1 of the image dissector tube has mounted therein at one end a transparent photo cathode 6 and axially spaced therefrom the apertured anode electrode combination designated as a whole at 2 and consisting in accordance with the present invention of apertured electrode discs 3, 4 and 5 the anode electrode combination forming in its entirety an electric lens. Each one of the electrodes 3, 4 and 5 is adapted to be connected with a source of potential, and the voltages applied to these electrodes determine the effective size of the scanning aperture as will be described presently. The electrode disc 5 is connected with a collecting electrode 16.

Fig. 2 illustrates diagrammatically and on an enlarged scale the creation of the effective scanning aperture. As indicated, by way of example, the electrodes 3 and 5 have each applied thereto a potential of +500 volts, while the center electrode 4 has applied thereto a potential of —100 volts. The mutual influence of these potentials on each other in the field between the electrodes is indicated by field lines, each line connecting points of like potentials with each other. These lines in reality indicate surfaces or planes of like potentials, and by way of example the surfaces having a potential of zero (0) and —50 volts are so designated. It will be noted that the electron beam 7, indicated by a dotted line, when reaching the zero potential plane in the anode is deflected back toward the positively charged electrode 3. Another electron beam 8, however, for instance will pass through the anode along a path as indicated in this Fig. 2, as it does not encounter the plane of zero potential.

If it is desired to reduce the size of the image element, it is only necessary to make the potential difference between the center electrode 4 and the cathode smaller. The zero potential surface will then move closer toward the axis 9 of the scanning aperture and will then prevent the passage even of electrons which are relatively closer to the axis 9. The electrons thus prevented from passing through the scanning aperture are deflected in similar manner as the electron beam 7.

An enlargement of the image element will be obtained when the potential on the electrode 4 is increased positively relatively to the cathode.

Fig. 3 illustrates a modification of the scanning anode electrode combination of the image dissector tube. The scanning anode electrode combination consists of apertured electrodes 10, 11 and 12, of which the electodes 10 and 12 are

maintained at a positive potential with respect to the center electrode 11, whose potential is approximately zero. The center electrode 11 in this embodiment consists of two axially spaced and apertured discs 11^a and 11^b conductively connected with each other. The collecting electrode 16 is connected with the apertured electrode 12. This form of the scanning anode has the advantage that the electron beam is subjected to a second similar contracting effect, when it reaches the aperture 13 in the electrode 11^b.

What I claim is:

1. An image dissector tube, particularly for television purposes, including within an envelope, a photo cathode, an apertured anode electrode combination for scanning the electron image appearing on said cathode, and a collecting electrode said apertured anode electrode combination comprising at least three apertured and axially alined electrodes of which the center electrode is adapted to having a negative potential with respect to the other two electrodes, said collecting electrode being connected with the apertured electrode farthest away from said cathode.

2. An image dissector tube, particularly for television purposes, including within an envelope, a photo cathode, an apertured anode electrode combination for scanning the electron image appearing on said photo cathode, and a collecting electrode said apertured anode electrode combination comprising four apertured and axially alined electrodes of which the two center electrodes are adapted to having a negative potential with respect to the two outer electrodes, said collecting electrode being connected with the apertured electrode farthest away from said cathode.

3. An image dissector tube, particularly for television purposes, including within an envelope, a photo cathode, an apertured anode electrode combination for scanning the electron image appearing on said photo cathode, and a collecting electrode said apertured anode electrode combination comprising four apertured and axially alined electrodes of which the two center electrodes are conductively connected with each other and are adapted to having a negative potential with respect to the two outer electrodes, said collecting electrode being connected with the apertured electrode farthest away from said cathode.

MARTIN PLOKE.