

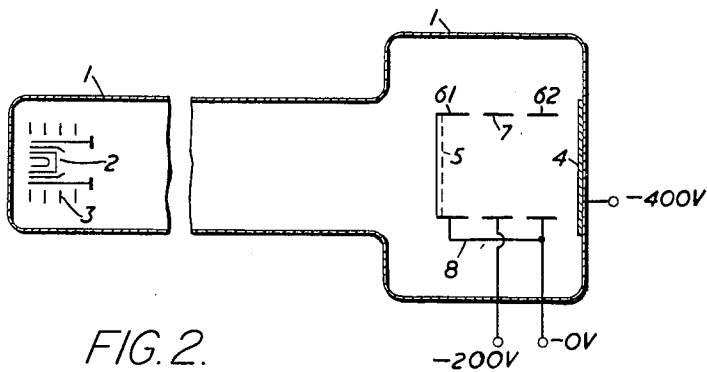
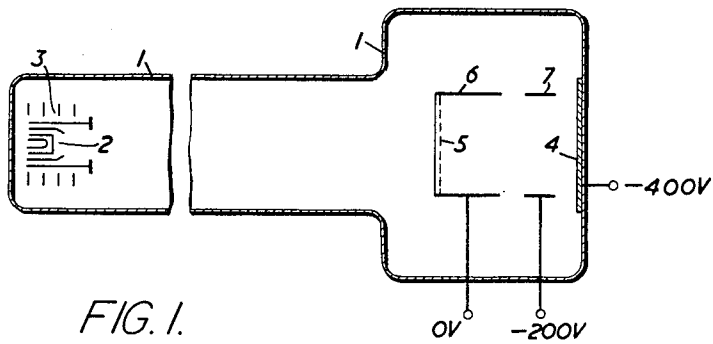
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PHOTOELECTRON ACCELERATION SYSTEM FOR CAMERA TUBES

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PHOTOELECTRON ACCELERATION SYSTEM FOR CAMERA TUBES

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6 Claims. (Cl. 315—10)

This invention relates to television and like camera tubes and more specifically to such tubes of the so-called "image orthicon" type, by which is meant, in this specification, a camera tube of the type in which electrons from a photo-cathode on which a light image is focused are projected on to a charge-storing target structure to produce thereon an electrical charge image which corresponds to the light image and is scanned by the cathode ray from an electron gun to develop picture signals for transmission or other utilisation. The present invention seeks to provide improved image orthicon tubes of better resolution than comparable known image orthicon tubes.

The invention is illustrated in and explained in connection with the accompanying drawings in which FIGURE 1, which is provided for purposes of explanation only, is a highly simplified schematic and diagrammatic representation of a typical known image orthicon tube, and FIGURE 2 is a similar representation of a tube in accordance with this invention. Both figures show their tubes only so far as is necessary to an explanation and description of this invention and in both figures like references indicates like parts.

Referring to FIGURE 1, the known form of image orthicon tube therein represented comprises within the usual evacuated envelope 1 an electron gun structure generally designated 2, centrally situated within an electron multiplying and picture signal output electrode system 3 of the customary secondary electron multiplying type and conventionally indicated. The tube envelope has a comparatively narrow elongated neck portion where the scanning section is situated (the scanning means are not shown) and a bulbous portion where the image section of the tube is situated. The image section includes a semi-transparent photocathode 4 on the inside of the end wall of the bulbous portion of the envelope and a target of customary form having the usual closely adjacent target screen and generally designated 5. The target is at the bottom of a target cup 6. Between the photo-cathode 4 and the circular wall of the cup 6 is an image accelerator electrode 7. In use the electrode 7 is maintained at a potential intermediate the potentials applied to the target and the photo-cathode, typical practical values of the potentials applied to the target, the accelerator and the photo-cathode being respectively 0, —200 volts and —400 volts.

Experiment has shown that the resolution attainable in the image section of the tube is limited by aberration of the photo-electrons from the photo-cathode 4. Now the degree of aberration is inversely proportional to the electric field strength at the photo-cathode. With a tube as shown in FIGURE 1 this field strength is necessarily low because of the presence, between the photo-cathode and the target, of the electrode 7, the operating potential of which is intermediate the target and photo-cathode potentials. The present invention seeks to overcome this defect and to provide the image section of an orthicon tube with an improved electrode arrangement which shall be such as to result in an increased electric field strength at the photo-cathode with consequent reduction in aberration and therefore improved resolution.

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According to this invention a camera tube of the image orthicon type comprises, in the image section thereof, a photo-cathode, a target, an image accelerator electrode between said target and said photo-cathode, and an additional electrode between said accelerator electrode and said photo-cathode, said tube being provided with suitable connection means for enabling the accelerator electrode to be operated at a potential intermediate the target and photo-cathode potentials, and the additional electrode to be operated at a potential at least approximately equal to the target potential.

In a preferred embodiment of the invention the target is at the bottom of a target cup having a substantially cylindrical wall and the accelerator electrode and the additional electrodes are cylindrical electrode co-axial with and of approximately the same diameter as said cylindrical wall. Preferably the target cup and the additional electrode are directly connected to one another so as to be, in use, at the same potential which will, in most cases, be zero (earth) potential. As will be apparent, in this embodiment the structure is effectively one in which the target cup has two portions—one being constituted by the additional electrode—with the accelerator electrode between them.

FIGURE 2 shows, in the same manner as FIGURE 1, a preferred embodiment of the invention. FIGURE 2 differs from FIGURE 1 in that the target cup is effectively divided into two portions 61 and 62 which are connected together inside the tube envelope by the connecting member 8, and which are spaced apart with the accelerator electrode 7 between them. Assuming the same potentials to be applied to the target cup, to the accelerator electrode 7 and to the photo-cathode 4 as are applied respectively to those electrodes in the case of FIGURE 1, the electrical field strength at the photo-cathode in the case of FIGURE 2 will be substantially increased as compared with FIGURE 1 with a consequent substantial decrease in aberration of the photo-electrons and improvement in image section resolution.

I claim:

1. A camera tube of the image orthicon type comprising in the image section thereof, a photo-cathode, a target, an image accelerator electrode between said target and said photo-cathode, and an additional electrode between said accelerator electrode and said photo-cathode, said tube including connection means for enabling the accelerator electrode to be operated at a potential intermediate the target and photo-cathode potentials, and the additional electrode to be operated at a potential at least approximately equal to the target potential.

2. A tube as claimed in claim 1 wherein the target is at the bottom of a target cup having a substantially cylindrical wall and the accelerator electrode and the additional electrode are cylindrical electrodes co-axial with, and of approximately the same diameter as, said cylindrical wall.

3. A tube as claimed in claim 2 wherein the connection means comprises a connecting member which directly connects the target cup and the additional electrode to one another.

4. A tube as claimed in claim 2 wherein the target cup has two portions, one of which is constituted by the additional electrode, with the accelerator electrode between them.

5. A camera tube as claimed in claim 1, and further including potential source means coupled to said connection means and having such magnitudes of potential as to maintain the accelerator electrode at a potential between the target and photo-cathode potentials and the

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additional electrode at a potential at least approximately equal to the target potential.

6. A camera tube as claimed in claim 4, and further including potential source means coupled to said connection means and having such magnitudes of potential as to maintain the target cup at zero potential, the accelerator electrode at a potential between the target cup and photo-cathode potentials, and the additional electrode at a potential at least approximately equal to the target cup potential.

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