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TELEVISION CAMERA PICK-UP TUBES

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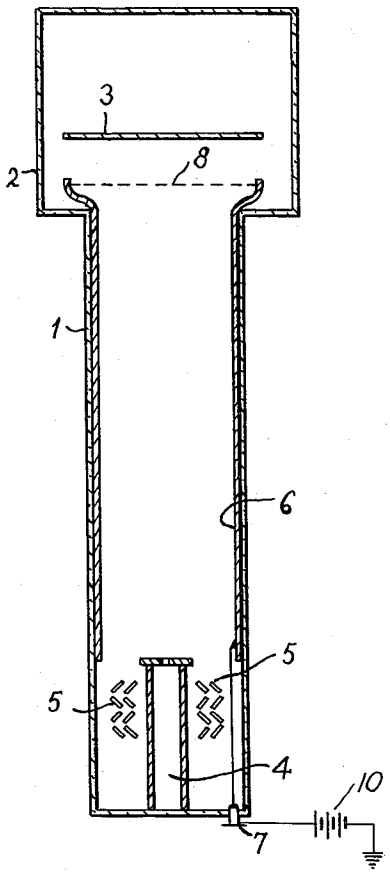


Fig.1

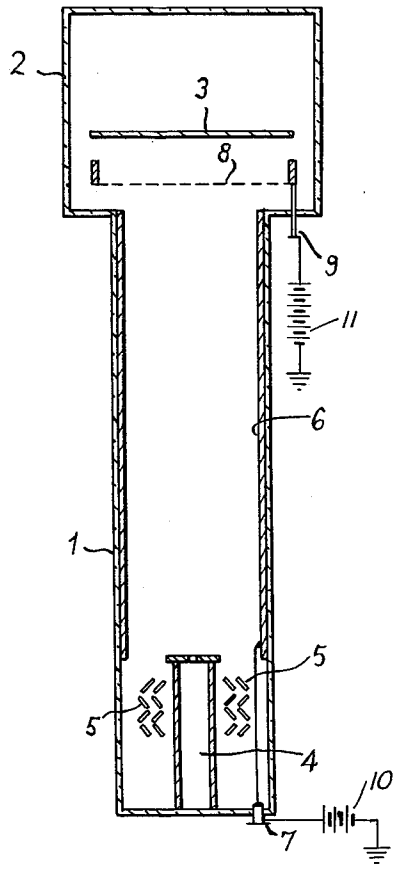


Fig.2

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TELEVISION CAMERA PICK-UP TUBES

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The present invention relates to television camera pick-up tubes of the kind in which a mesh electrode is located between a wall anode and the target of the tube so that when energised it can maintain the electrostatic field lines in front of the target in mutually parallel or substantially mutually parallel relationship. A specific example of such a tube is known as an image orthicon.

The mesh electrode is mounted close to the target surface and on the side of the target that is scanned by the electron beam originating from the electron gun and is conventionally connected electrically and physically to the wall anode.

However, it has been found that, in use, such an electrode arrangement often gives rise to a double image in the output signal from the tube. Present understanding of the subject leads us to believe that this double image is produced by the electron beam returned from the target and modulated by picture information impinging on the mesh electrode and liberating secondary electrons therefrom. These secondary electrons are accelerated by the potential applied to the wall anode and arrive at the electron multiplier section normally provided in such tubes displaced in time relative to that portion of the beam which has not impinged on the mesh surface.

An object of the present invention is the elimination or substantial elimination of this double image by modifying the hitherto usual wall anode and mesh electrode structure of the tube.

Accordingly, the invention consists in a television pick-up tube of the kind incorporating a scanning beam source, a target electrode, a wall anode and a mesh electrode between said wall anode and said target electrode for enabling the electrostatic field lines in front of the target to be maintained mutually parallel or substantially so, characterised in that said mesh electrode is physically and electrically separate from said wall anode and is provided with means for separately connecting it to a source of energising potential.

In order that the invention may be more clearly understood reference will now be made to the accompanying drawings which show sectional views of a hitherto conventional tube and a tube according to the invention and in which:

FIGURE 1 shows a tube of such conventional constructions, and

FIGURE 2 shows a tube according to the invention.

Referring to the drawings, which are largely schematic, the conventional structure of tube shown in FIGURE 1 comprises a cylindrical glass tube **1** one end of which is enlarged at **2** to form a cylindrical bulb in which is located a target electrode **3**. At the other end of the tube there is provided a scanning gun electrode structure and an electron multiplier electrode structure schematically shown at **4** and **5**, respectively. The electron multiplier surrounds the scanning gun. Between the scanning gun and the target there is located a final accelerating wall anode **6** provided with a connection means **7** for connecting it to a suitable source of energising potential. Any convenient source usual in the art may be provided, and has been illustrated as a battery **10**. Mounted on the end of the wall anode so that it is between the wall anode and the target **3** there is provided a mesh electrode

8 which necessarily by its physical and electrical connection to the wall anode will be energised at the same potential as the wall anode. It will be understood by those skilled in the art that a decelerator electrode is ordinarily located immediately adjacent and in front of the target electrode but this has not been illustrated in the drawing as its presence is not necessary to an understanding of the invention.

Such a tube often gives rise to a double image in the output signal from the tube and we believe that this double image is produced by the electron beam, on its return from the target and modulated by picture information, impinging on the mesh electrode **8** and liberating secondary electrons from the surface thereof. The secondary electrons arrive at the multiplier section **5** displaced in time relative to that portion of the electron beam which has not impinged on the surface of the mesh electrode **8**.

FIGURE 2 shows a tube similar in other respects to the arrangement of FIGURE 1 but modified in accordance with the present invention. The mesh electrode **8** is physically and electrically divorced from the wall anode **6** with its terminal connection **7** and is located on any suitable support means (not shown) spaced from and in front of the target, viz. on that side of the target facing the electron beam from the scanning gun **4**, and immediately adjacent the end of the wall anode **6**, as can be seen in the drawing. The electrode support means may comprise struts of any desired nature extending from the wall of the glass bulb **2** at any desired location, or may be a cylinder surrounding and connected to the electrode and carried by the lower part of the bulb **2**. Such arrangements have not been illustrated, as they are obvious to those skilled in the art, and moreover would hinder the showing of the invention itself. The electrode **8** is connected to a separate terminal connection **9** whereby the mesh electrode can be connected to any suitable source of potential so that it may be maintained at a potential which is positive relative to the wall anode **6**, whereby no accelerating field is present to accelerate secondary electrons away from the mesh electrode and into the multiplier section **5**. Such potential source may take any desired form and has been illustrated as a battery **11** of higher voltage than that of the battery **10**.

The invention may also therefore be considered to include a method of operating a television pick-up tube of the kind incorporating a scanning beam source, a target electrode, a wall anode and a mesh electrode between said wall anode and said target electrode for enabling the mesh electrode is maintained at a potential different from electrostatic field lines in front of the target to be maintained mutually parallel or substantially so, in which the and more positive than said wall anode whereby double images in the output signal from the tube are substantially eliminated.

It will be apparent that the invention has been described only by way of example and that various modifications may be made to the specific details referred to without in any way departing from its scope, as defined in the appended claims.

We claim:

1. In a television pick-up tube arrangement comprising a target electrode located for scanning by a beam of low velocity electrons, a scanning gun electrode structure to produce electrons to scan said target electrode, a final accelerating anode mounted on the wall of said tube between said scanning gun electrode structure and said target electrode, a mesh electrode physically separated from said final accelerating anode but located immediately adjacent thereto between said final accelerating anode and said target, the improvement which consists in the provision of a first source of positive energising potential,

means for connecting said final accelerating anode to said first source of positive energising potential, a second source of positive energising potential higher than that of said first source of positive energising potential, and means connecting said mesh electrode to said second source of positive energising potential, whereby said mesh electrode is positive with respect to said final accelerating anode.

2. A television pick-up tube arrangement comprising a cylindrical glass tube, one end of said tube being enlarged to form a cylindrical bulb, a target electrode in said bulb, a scanning gun electrode structure in the end of said cylindrical glass tube remote from said bulb, a final accelerating anode mounted on the wall of said tube carried by the wall of said cylindrical glass tube between said scanning gun electrode structure and said target electrode, a first source of positive energising potential, means for connecting said first source of positive energising potential to said final accelerating anode, a mesh electrode in said bulb located immediately adjacent the end of said final accelerating anode between the end of said anode and said target electrode, a second source of energising potential higher than that of said first source of energising potential, and means connecting said second source of positive energising potential to said mesh electrode, whereby said mesh electrode is positive with respect to said final accelerating anode.

3. A television pick-up tube arrangement comprising a cylindrical glass tube, one end of said tube being enlarged to form a cylindrical bulb, a target electrode in said bulb,

a scanning gun electrode structure in the end of said cylindrical glass tube remote from said bulb, an electron multiplier electrode structure in said cylindrical glass tube and surrounding said scanning gun electrode structure, a final accelerating anode mounted on the wall of said tube carried by the wall of said cylindrical glass tube between said scanning gun electrode structure and said target electrode, a first source of positive energising potential, means for connecting said first source of positive energising potential to said final accelerating anode, a mesh electrode in said bulb located immediately adjacent the end of said final accelerating anode and between the end of said anode and said target electrode, a second source of energising potential higher than that of said first source of energising potential, and means connecting said second source of positive energising potential to said mesh electrode, whereby said mesh electrode is positive with respect to said final accelerating anode for passing the scanning beam through said mesh to strike said target electrode, and allow electrons repelled by focal potentials on said target electrode to return towards said electron multiplier electrode structure.

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