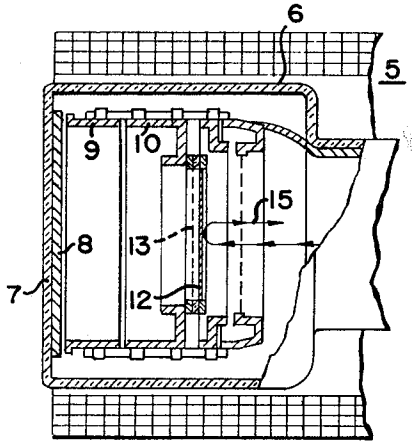
Jan. 9, 1968 D. L. SCHAEFER 3,363,126

IMAGE ORTHICON CATHODE RAY TUBE WITH COPPER SCREEN TARGET HAVING A CHROMIUM SUPPORTED MAGNESIUM OXIDE FILM

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Fig. 1



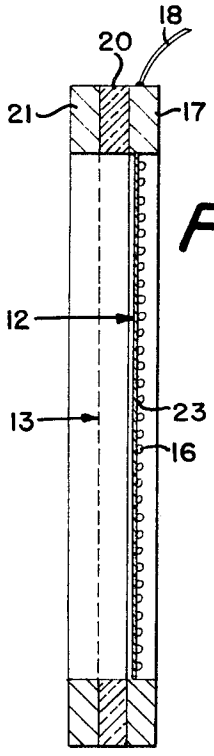


Fig. 2

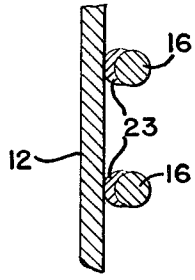


Fig. 3

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IMAGE ORTHICON CATHODE RAY TUBE WITH COPPER SCREEN TARGET HAVING A CHROMIUM SUPPORTED MAGNESIUM OXIDE FILM

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5 Claims. (Cl. 313—65)

This invention relates to cathode ray tubes and more particularly to picture-signal-generating or camera tubes of the type in which video or picture signals are obtained by scanning a planar electric charge-storing target with an electron beam. The target structure of the present invention is particularly adapted for use in camera tubes of the image orthicon type wherein the charge storing target is mounted along the electron beam path in the decelerating electrode region.

In an image orthicon tube or the like a bi-grid target structure is used and is fabricated by forming a thin film magnesium oxide target in contact with a copper mesh which is the same type mesh as used in the standard target mesh assembly of the conventional tube. The bi-grid target is insulated from the collector mesh and the bi-grid mesh on which it is supported faces the scanning section of the tube. An external connection is made to the bi-grid mesh so that its potential can be controlled and it is coated to prevent sagging.

When the bi-grid target is formed on the copper mesh as above, the resulting target film is always low in resistivity, indicating that the presence of the copper during the processing has in some way reacted with the magnesium oxide film and degenerated its usual characteristics.

In accordance with the invention it has been found that by evaporating a layer of chromium over the copper mesh, targets can be processed which have the characteristics usually associated with magnesium oxide films. It is apparent that chromium does not adversely affect the film and prevents the copper from reacting with it or sagging and breaking it during heating in manufacture.

It has also been found that it is preferable to use the basic copper mesh as above described, rather than a mesh of some other material which would not react with the film, because the techniques for fabricating the copper mesh are well established and result in a mechanically rigid structure and successive satisfactory duplication in manufacture when coated with the chromium layer.

The invention will further be understood from the following description, with reference to the accompanying drawing, and its scope is pointed out in the appended claims. In the drawings:

FIG. 1 is a longitudinal cross-sectional view of the target and photo-cathode section of an image-orthicon type tube constructed in accordance with the invention.

FIG. 2 is an enlarged view, also in cross-section, of the target structure of the tube of FIG. 1 showing further details of the invention, and

FIG. 3 is a fragmentary view, in cross-section and on an enlarged scale, of a portion of the target structure of FIGS. 1 and 2 showing further details of the screen construction in accordance with the invention.

Referring to the drawing, in which like reference numerals are applied to like elements throughout the figures, and referring particularly to FIG. 1, the target and photo-cathode end of a camera tube **5** includes a glass envelope **6** having a window **7** at the forward end and on the inside surface of which is a photo-cathode **8**. An accelerating electrode **9** and a target-support electrode **10** are provided on the interior of the tube. A suitable planar

charge-storage target **12** and an associated mesh collector electrode **13** is mounted in the target support electrode. As it is conventional, the face of the target **12** remote from the photo-cathode **8** is scanned by an electron beam **15** generated in the electron gun portion of the tube (not shown).

Referring now to FIGS. 2 and 3 along with FIG. 1, the target structure is of the bi-grid type fabricated by forming a thin film magnesium oxide target **12** in contact with a copper mesh target screen **16** which is of the same type mesh as used in the standard target mesh assembly of a conventional tube. The screen and target structure are mounted on the same mounting ring **17** of conductive material. Connected to the ring is a supply conductor or lead **18** for applying thereto a bias control voltage in operation. The ring is insulated from the copper mesh collector electrode **13** by an insulating ring **20** and is provided with a mounting ring **21** for supporting said collector electrode.

As hereinbefore mentioned, the bi-grid target is formed on the bi-grid mesh and the resulting target film is normally low in resistivity indicating that the presence of the copper in some way reacts with the magnesium oxide film and degenerates its normal effectiveness. In accordance with the invention, it has been found by evaporating a layer of chromium **23** over the copper mesh **16** the target has the characteristics usually associated with magnesium oxide films used as information storage targets. It is apparent that the chromium does not adversely affect the film and prevents the copper from reacting with it.

As shown more clearly in FIG. 3, the chromium coating **23** is in contact with both the magnesium oxide film and the copper wires **16** of the mesh. The target structure is thus a mesh-magnesium film which is entirely protected from the adverse effect of the copper mesh which supports it by the inter position of the chromium layer evaporated on the copper prior to the formation of the magnesium oxide layer directly on the chromium surface as indicated in the drawing in FIG. 3. Screen distortion and film breakage is eliminated.

As mentioned hereinbefore, it is desirable to use the basic copper mesh of the normal target structure rather than a mesh of some other material because the techniques for fabricating copper mesh are perfected and efficient and are adapted for producing the same effective duplication of the structure over a large production.

I claim:

1. In a cathode-ray tube of the image-orthicon type, a target structure comprising in combination, an electrically-conductive screen providing a supporting element for said structure, a fixed conductive mounting ring by which said screen is supported, means providing a magnesium-oxide film in spaced relation to said screen in said target structure, and a layer of chromium carried by said screen and the conductors thereof and of a thickness to contact such magnesium oxide film thereby to maintain the screen in spaced relation thereto and taut to prevent film breakage.

2. In a cathode-ray tube of the image-orthicon type, a target structure as defined in claim **1**, wherein the conductive screen is of copper mesh, and wherein the chromium layer is applied to the forward face of said screen.

3. In a cathode ray tube, the combination of an image-storage target and a photo-cathode forward of said target in the electron beam path, said target comprising a copper-mesh screen mounted in a plane normal to the path of the scanning beam of said tube, a mounting ring for said screen fixed within said tube and having an electrical connection lead for applying thereto a control voltage for said screen, a copper-mesh collector electrode of the

screen type spaced forward from said copper-mesh screen and insulated therefrom, means providing a magnesium-oxide target film in spaced parallel relation to said copper-mesh target screen, and a layer of chromium deposited on and carried by said copper-mesh target screen having a thickness to contact the magnesium-oxide target film and to maintain the spacing between said film and the copper-mesh target screen for protecting the target structure from deteriorating effects of the copper screen in contact therewith and film breakage by distortion of said screen in the manufacturing process.

4. In a cathode-ray tube of the image-orthicon type, a target structure comprising, means providing a magnesium-oxide film extending in a plane normal to the longitudinal axis of the tube, an insulated fixed supporting element for said last-named means, a fixed copper-mesh collector electrode mounted in spaced parallel relation to said magnesium oxide film means forward thereof along the said axis, a copper-mesh target screen mounted on close spaced parallel relation to said magnesium-oxide film means on the same supporting means rearwardly

thereof along said axis, and means providing a layer of chromium in contact with and between the magnesium oxide film and said screen to space said elements and hold said screen taut.

5. In a cathode-ray tube of the image orthicon type, the target structure as defined in claim 4, wherein the chromium layer is formed on the forward face of the target screen mesh, and wherein the magnesium-oxide film is formed on said chromium layer in intimate contact therewith.

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