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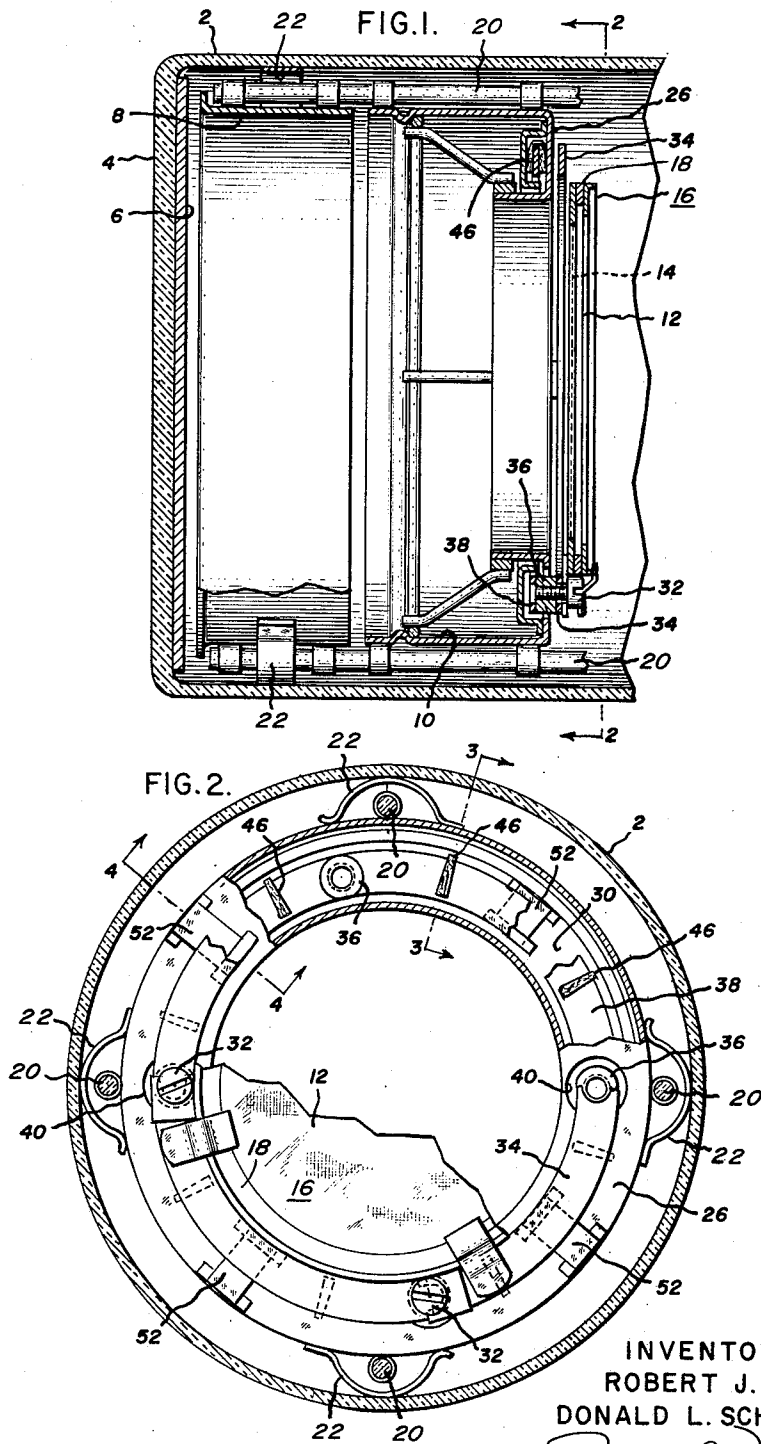
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VIBRATION ISOLATING ELECTRODE MOUNT

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2 Sheets-Sheet 1



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FIG. 3.

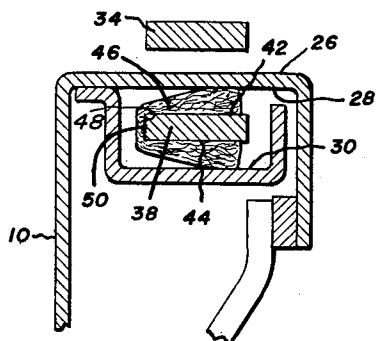


FIG. 4.

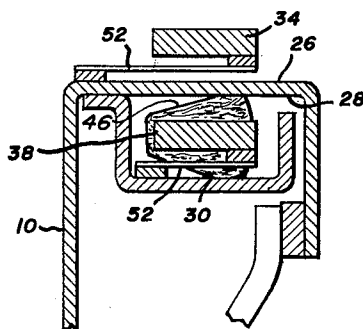
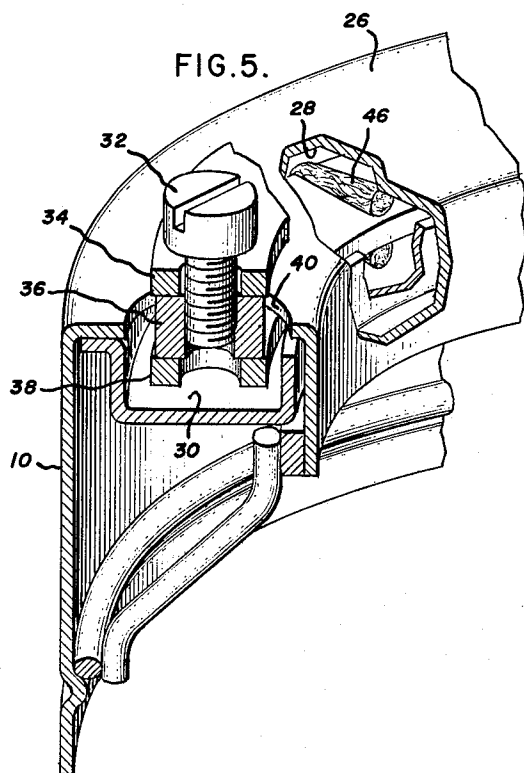


FIG. 5.



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VIBRATION ISOLATING ELECTRODE MOUNT
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The present invention relates to improvements in camera tubes, such as those of the image orthicon type, wherein a charge pattern representative of an optical image is formed on a thin membrane-like charge storage target which may cooperate with an adjacent foraminate or mesh-like electron collector electrode.

As is well known to those skilled in the art, in the operation of a camera tube of the image orthicon type, light falling on the photo-emissive surface of the tube produces emission of electrons which are accelerated axially toward, and impinge upon, a transversely extending charge storage target. The primary electrons arriving at the charge storage target produce emission of secondary electrons which are collected by a closely spaced confronting foraminate or mesh-like electron collector electrode so as to leave a charge pattern on the storage target which is representative of the optical image supplied to the photo-sensitive surface of the tube. The stored information is read out as modulation of the return current of an electron beam which scans the charge storage target.

In such a camera tube any relative motion between the charge storage target and the adjacent electron collector mesh electrode has a severely adverse effect on the quality of a picture or image reproducible from the signal read out from the tube. Such relative motion usually shows up in the reproduced picture as microphonic bar patterns, which of course severely impair the fidelity of the resulting picture. Moreover the target and mesh electrode are frequently supported drum-head fashion exclusively from an annular peripheral frame and hence are susceptible to relative movement toward and away from one another when the tube is subject to vibration at frequencies approaching any of the resonant frequencies of the target or collector electrode.

Accordingly, it is a principal object of the present invention to provide an improved vibration-isolating mounting means for the target and collector electrode assembly of a camera tube of the foregoing character, such as to minimize movement of the charge storage target relative to the collector electrode.

Another object is to provide an improved vibration-damping mounting means for an image orthicon target or the like which provides effective ruggedization against severe environmental conditions of vibration, and enables attainment of acceptable picture quality under vibrational conditions which have heretofore completely precluded satisfactory tube operation.

Another object is to provide a vibration-damping mount for target collector electrode assemblies and the like which insures substantial attenuation of vibration at frequencies equal to and above also below the resonant frequencies of the target and collector electrode, but permits sufficient movement of the target and collector electrode at frequencies below their resonant frequencies so as to avoid rupture or other shock damage to the target or collector electrode.

Another object is to provide such a vibration isolating

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mount which is mechanically simple, inexpensive, durable, and easy to install.

Another object is to provide such a vibration-isolating mount fabricated from materials which are not detrimental to the high vacuum environment of an electron tube.

These and other objects of the invention will be apparent from the following description and the accompanying drawings, wherein:

FIGURE 1 is an axial sectional view of the image portion of an image orthicon type of camera tube constructed according to the present invention;

FIGURE 2 is a transverse partially broken away sectional view of the structure of FIGURE 1 taken on the line 2-2 thereof;

FIGURE 3 is an enlarged fragmentary sectional view of a portion of the structure of FIGURE 2 taken on the line 3-3 thereof;

FIGURE 4 is an enlarged fragmentary sectional view of a portion of the structure of FIGURE 2 taken on the line 4-4 thereof; and

FIGURE 5 is an enlarged fragmentary perspective view of a portion of the structure of FIGURE 2.

Referring to the drawings and particularly to FIGURES 1 and 2 thereof, there is shown a portion of a camera tube of the image orthicon type including an evacuated envelope 2 having at its front end a viewing window 4 on the interior surface of which is a photo-sensitive layer 6. Responsive to a light image falling on the layer 6, electrons are emitted therefrom and are accelerated axially or longitudinally by an annular accelerating electrode 8, and an annular target cup electrode 10 to a transverse planar membrane-like electric charge storage target 12. The primary electrons hitting the charge storage target 12 produce emission of secondary electrons which are collected by a meshlike electron collector electrode 14 disposed in closely spaced confronting relation with the forward face of the target 12. A charge pattern is thus formed on the charge storage target representative of the light image falling on the photo emissive layer 6.

The target-collector electrode assembly 16 includes an annular supporting frame 18 across which the collector mesh 14 and the target 12 are stretched drum-head fashion in spaced relation. The accelerating electrode 8 and target cup electrode 10 are connected by insulating members 20 and are firmly supported from the interior surface of envelope 2 by a plurality of projecting members 22.

The target-collector electrode assembly 10, in accordance with the present invention, is supported from the main support means or target cup electrode 10 by a vibration-isolating mount 24 which will now be described in detail with respect to FIGS. 3 and 5. The target cup electrode or main support means 10 includes a cylindrical wall portion provided at its rearward end with an annular radially inwardly directed flange or wall member 26 forming a longitudinally facing transverse shoulder 28. Also rigidly secured to electrode 10 is a spaced annular wall member forming a shoulder 30 spaced opposite shoulder 28. The target-collector electrode assembly 16 is rigidly clamped by screws 32 (FIG. 5) to an outer ring 34. The outer ring 34 is in turn rigidly secured by circumferentially spaced posts 36 to an annular inner ring or mounting member 38 extending in spaced relation between shoulders 28 and 30. Openings 40 in flange 26 are of sufficient size to accom-

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modate posts 36 with clearance between the posts and flange 26. The annular mounting member 38 is of somewhat flattened cross section forming faces 42, 44, as best shown in FIGURE 3, which confront opposing shoulders or surfaces 28, 30 of target cup electrode 10.

The annular inner ring 38 is maintained in spaced axial relationship between shoulders 28 and 30 on electrode 10 by a plurality of pads 46 of vibration-absorbent material compressed between the annular shoulders 28, 30 and the opposing faces 42, 44. The pads 46 are desirably of such a resilient quality as to permit slight axial movement of the member 38, and hence of the target-collector electrode assembly 20, as low frequencies below the resonant frequency of the target 12 or collector electrode 14, so as to avoid rupture or other injury to the target when the tube is subjected to such low frequency vibrations. However the pads substantially completely attenuate higher frequency vibrations such as would cause drum-head like vibrations and relative movement of the target 12 and collector electrode 14 at frequencies equal to or above their resonant frequency.

It is a particular feature of the invention that the pads 46 have not only the desired mechanical properties for vibration and shock attenuation, but also are fully compatible with the requisites of the high vacuum environment in which the target-collector assembly is intended to operate. To this end the pads 46 are made of a material having a sufficiently low vapor pressure of low capacity for occluded gases to avoid appreciable outgassing during tube operation. Stainless steel or Monel metal, for example, are suitable materials for the pads, and also glass, quartz and other non-metallic materials may be employed if sufficiently non-gassy. Moreover, we have found that the pads may consist of bundles of fibers of such non-gassy material, partially felted or worked into a resilient wool-like mass. Desirably and preferably, however, each pad may consist of a roll of metal mesh, of appropriate diameter such as to support the annular member 38 snugly and in compression between the shoulders 28, 30, 42, 44, the degree of such compression being suitable to give the desired damping characteristic at the desired absorbing frequency. Such rolls may each be bent around member 38, as preferably about outer edge 48, best shown in FIGURE 3, and permanently secured thereto as by welds 50 at the outer edge of the member 38.

To prevent any transverse movement of the target 12 or collector electrode 14, without interfering with the vibration damping effect of the pads 46 on axial movement of the target 12 or collector electrode 14, annular member 38 is secured to the shoulder 30, and the member 34 is secured to the flange 26, by a plurality of radially extending flexible fingers 52, as best shown in FIGURE 4.

A vibration-isolating target mounting structure constructed as above described has been found to be extremely effective in preventing movement of the target 12 relative to the collector electrode 14 at frequencies such as have heretofore produced undesirable observable effects in the picture or other image reproduced from the output signal of the tube. Moreover such a vibration-damping mount permits modest damped movement of the target-collector electrode assembly at low frequencies below the frequency of resonance of the target 12 or mesh 14, so as to preclude rupture or other damage to the target 12 or mesh electrode 14 when the tube is subject to such low frequency vibrations. Thus it will be evident that such a mounting arrangement as herein described provides effective protection or ruggedization of the tube against the deleterious effects of vibration and enables continued operation of the tube with desirable picture quality under extremely adverse vibrational conditions.

It will be appreciated by those skilled in the art that the invention may be carried out in various ways and may take various forms and embodiments other than those illustrative embodiments heretofore described. Accordingly it is to be understood that the scope of the invention is not

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limited by the details of the foregoing description, but will be defined in the following claims.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In an electron discharge device, a main support having a pair of spaced annular wall members, an electric charge storage target having a supporting frame, and means for supporting said target frame from said main support including an annular mounting member attached thereto and axially spaced from said supporting frame and positioned in spaced relationship between said pair of spaced annular members, and vibration-absorbent pads compressed between said annular mounting member and said spaced annular wall members to dampen vibration of said annular mounting member.

2. In an evacuated electron discharge device of the image orthicon type, a main support therein having a pair of spaced transversely extending confronting shoulders defining an annular chamber, an electric charge storage target having a supporting frame, and means for supporting said target from said main support including an annular mounting member attached to said target frame in axial spaced concentric relationship and positioned between said confronting shoulders, a plurality of pads of vibration-absorbent low vapor pressure material having a low capacity for occluded gases compressed between said mounting member and said confronting shoulders, and means for restraining transverse movement of said target relative to said main support.

3. In an evacuated electron discharge device of the image orthicon type, an annular target cup electrode therein forming a main support having a pair of spaced annular transversely extending confronting shoulders, a transversely extending electric charge storage target having an annular supporting frame, and means for supporting said target from said target cup electrode including an annular mounting member rigidly secured to said target frame and extending between said confronting shoulders, vibration-absorbent pads of low vapor pressure material having a low capacity for occluded gases compressed between said mounting member and each of said confronting shoulders to support said mounting member against longitudinal movement, and a plurality of flexible fingers extending radially between said mounting member and said target cup electrode for restraining transverse movement of said target relative to said target cup electrode.

4. In an evacuated electron discharge device of the type having a thin transversely extending membrane-like charge storage target therein mounted on an annular peripheral supporting frame, an electron collector electrode mounted on said supporting frame in spaced confronting relation with said target, and an annular main support for said target and collector electrode, means for supporting said target and collector electrode assembly from said main support comprising a target mounting member rigidly secured to said frame and defining a flat annular member with opposed surfaces, means on said main support forming a set of oppositely facing transverse shoulders said flat annular member being positioned concentrically between said shoulders, and a plurality of vibration absorbent pads of fibrous metallic material compressed between the said shoulders and the said flat annular member.

5. In an evacuated electron discharge device of the type having a thin transversely extending membrane-like charge storage target mounted on an annular peripheral supporting frame, an electron collector electrode mounted on said supporting frame in spaced confronting relation with said target, and a main support for said target and collector electrode, means for supporting said target and collector electrode assembly from said main support comprising a target mounting member in the form of a flat annular member rigidly attached to said frame, means on said main support forming a pair of oppositely facing

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transverse shoulders said flat annular member being positioned concentrically between and spaced from said transverse shoulders, a plurality of fibrous vibration absorbent pads of metallic material compressed between the said flat annular member and said shoulders, each of said pads comprising a roll of metal wire mesh looped over at least one edge of said annular member to maintain said annular member in spaced axial relationship from said shoulders for vibration damping thereof, and a plurality of flexible fingers extending transversely between said mounting member and said main support for restraining

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transverse movement of said target relative to said main support.

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