United States Patent

Miyama et al.

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[54] THIN-WINDOW RECORDING TUBE

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[52] **U.S. Cl.** .....**313/92 R,** 313/74
[51] **Int. Cl.**.....**H01j 29/18,** H01j 29/28, H01j 33/00
[58] **Field of Search**.....313/92, 74

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[57] **ABSTRACT**

A faceplate of a thin-window recording tube comprising a metal backing electrically isolated from the outside of an evacuated envelope of the recording tube. An embodiment of the faceplate has a metallic support the side surfaces of which are covered with an insulating adhesive. Another embodiment has a metallic support the elongated target of which has formed therein a plurality of circular apertures.

2 Claims, 5 Drawing Figures

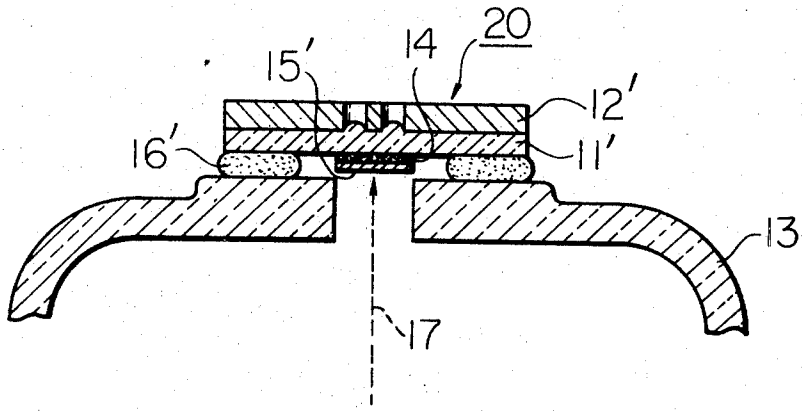


Fig. 1

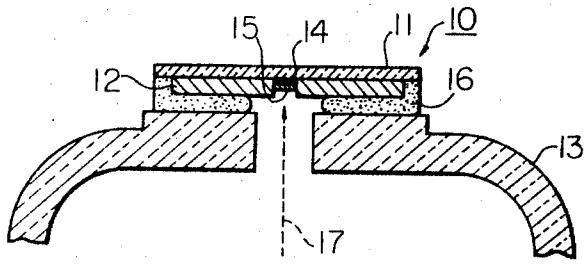


Fig. 2

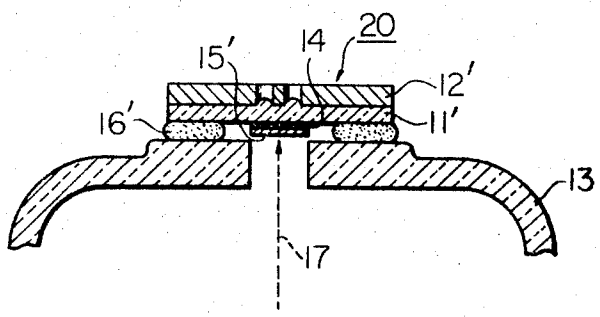


Fig. 3

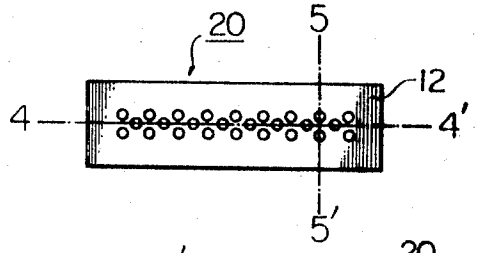


Fig. 4

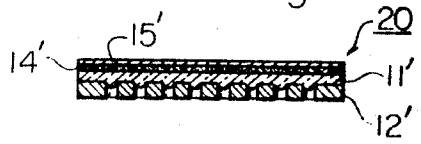
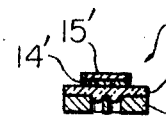


Fig. 5



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THIN-WINDOW RECORDING TUBE

This invention relates to a thin-window recording tube and more particularly to a faceplate having a metal backing electrically isolated from the outside of an evacuated envelope of the recording tube.

A conventional recording tube has a metal backing deposited on its fluorescent layer. The metal backing is scanned by an electron beam for transmitting therethrough the electron beam to the fluorescent layer to cause an optical signal to be produced in the fluorescent layer in accordance with an electric signal borne by the electron beam. The metal backing is electrically connected through a metallic support to the outside of an evacuated envelope of the recording tube. A high positive potential is usually applied to the metal backing. This incurs a serious danger to the operator when in operation.

The conventional recording tube also uses a metallic support secured to a thin transparent sheet and having a slit aperture acting as a target for an electron beam. The width of the slit aperture should be small enough to assure sufficient mechanical strength of the transparent sheet which is subject to a high pressure difference between the inside and outside of the evacuated envelope. The aperture, thus, being extremely narrowed, it is difficult to uniformly fit the fluorescent layer into such narrow aperture and to deposit the metal backing on the fluorescent layer. It is also difficult to enable the electron beam to precisely scan the narrow target so as to prevent the electron beam from missing the target.

It is, therefore, an object of this invention to provide an improved faceplate having a metal backing electrically isolated from the outside of an evacuated envelope of a recording tube.

It is another object of the invention to provide an improved faceplate having an elongated target which is composed of a plurality of circular apertures formed therein.

In the drawings:

FIG. 1 is a cross-sectional view showing a preferred embodiment of a faceplate according to this invention;

FIG. 2 is similar to FIG. 1 but shows another preferred embodiment of the invention;

FIG. 3 is an enlarged top view of a portion of a faceplate shown in FIG. 2;

FIG. 4 is a sectional view taken along the line 4—4′ of FIG. 3; and

FIG. 5 is similar to FIG. 4 but is taken along the line 5—5′ of FIG. 3.

Referring now to FIG. 1, there is shown a faceplate according to this invention, which is generally indicated at numeral **10**. The faceplate **10** comprises a transparent sheet **11** and a metallic support **12** both having a similar coefficient of thermal expansion. The transparent sheet **11** is made of a rigid transparent material such as glass or mica and has substantially the same area as that of the end surface of an evacuated envelope **13** of a recording tube. The metallic support **12** has substantially centrally thereof an elongated target of a slit aperture and is narrower than that of the end surface of the envelope **13**. The metallic support **12** is secured to the transparent sheet **11** in alignment therewith to form a junction. A fluorescent material is fit into the slit target and is deposited thereon to form a fluorescent layer **14**. The fluorescent layer **14** is coated with a metal backing **15** by vacuum evaporation. The junction, which is made up of the fluorescent layer **14** and the metal backing **15** in its slit target, is secured to the end of the evacuated envelope **13** by an adhesive **16** with its metallic support **12** facing an electron gun (not shown) of the recording tube. In this instance, the adhesive **16** may preferably be of electrically insulating property and may cover not only the inner surface of the metallic support **12** but the side surfaces of the same. Since the metallic support **12** is closely received by the insulating adhesive **16** in such a manner as described above, the metal backing **15** is electrically insulated from the outside of the evacuated envelope **13**.

When, in operation, an electron beam emitted from the electron gun and indicated at numeral **17** hits lengthwise the metal backing **15** of the slit target, a substantial portion of the electron beam **17** transmits therethrough and causes the fluorescent layer **14** to luminesce in accordance with the electric signal supplied to the electron gun. The metal backing **15** and accordingly the metallic support **12** are biased with a high positive voltage, but, because the metallic support **12** is enclosed with the insulating adhesive **16**, there is the operator can be freed of a danger even when the touches the outside of the envelope **13**.

FIGS. **2** to **5** show a more preferred embodiment of a faceplate according to this invention, in which similar numerals indicate corresponding elements of the faceplate.

As best shown in FIGS. **3** to **5**, the faceplate, generally indicated at numeral **20**, comprises a junction including a transparent sheet **11′** and a coextensive metallic support **12′** secured by fusion to each other. The metallic support **12′** has substantially centrally thereof an elongated target composed of a plurality of circular apertures. The circular apertures may preferably be arranged in an array and have diameters smaller than that of the electron beam **17**. To the contrary of the first embodiment, the fluorescent layer **14′** is directly deposited on the surface of the transparent sheet **11′** opposite to the metallic support **12′**. It is quite natural that the fluorescent layer **14′** be positioned coextensively with the elongated target. The fluorescent layer **14′** is also covered with a metal backing **15′**. The junction is secured by an adhesive **16′** to the end of the evacuated envelope **13** with its transparent support **12′** facing the electron gun. In this instance, the adhesive **16′** need not be of insulating property because the metal backing **15′** is electrically isolated by the transparent insulating sheet **11′** from the outside of the envelope **13**. As shown, it is of no importance whether or not the adhesive **16′** does enclose the transparent sheet **11′**.

The faceplate of the latter embodiment is advantageous in the following respects: It is easy to manufacture because the fluorescent layer and the metal backing can be directly applied on the surface of the transparent sheet without fitting them into an extremely narrow target. With a plurality of circular apertures provided, the effective width of the target is increased without sacrificing the mechanical strength of the faceplate itself. In addition, a higher resolution is available because a plurality of convex lenses are formed of those portions of the transparent material which are raised into the corresponding circular apertures, as shown, when the transparent sheet is fused to the metallic support.

What is claimed is:

1. A faceplate for a thin-window recording tube having an evacuated envelope and an electron gun, said evacuated envelope having an elongated aperture formed at the end opposite to said electron gun, said faceplate comprising:

a junction having a transparent sheet and a metallic support which are secured to each other and have a substantially common coefficient of thermal expansion, said metallic support having a plurality of circular apertures formed to provide a thin window which extends lengthwise and substantially centrally of said metallic support, said transparent sheet being fused to said metallic support so that convex lenses are formed of those portions of said transparent sheet into said apertures,

a fluorescent layer deposited on said transparent sheet coextensively with said thin window,

a metal backing deposited on said fluorescent layer, and,

an insulating layer acting as an adhesive agent to mount said junction on the end of said evacuated envelope with said transparent sheet in contact with said insulating layer, whereby an electron beam emitted from the electron gun and then passing through the elongated aperture scans said metal backing lengthwise, causing said fluorescent layer to luminesce in accordance with an electric signal supplied to the electron gun,

said metal backing being electrically isolated from outside of said evacuated envelope.

2. A faceplate according to claim 1 wherein said circular apertures are in an array and have diameters smaller than that of said electron beam.

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