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[54] **POST-DEFLECTION ACCELERATION TYPE COLOR CATHODE-RAY TUBE**

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[51] **Int. Cl.** **H01j 29/06,** H01j 29/28

[58] **Field of Search** ..... 313/85 S, 92 R, 92 PD, 313/92 B, 106, 107

[56] **References Cited**

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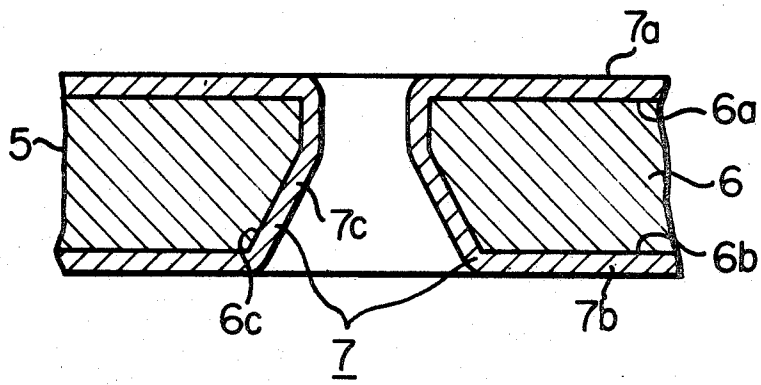
[57] **ABSTRACT**

A post-deflection acceleration type color cathode-ray tube including a shadow mask having on the surface thereof a secondary electron emission preventing layer made of graphite. Such graphite layers may also be applied on the phosphor screen and on the inner surface of the funnel portion of the tube to further improve the secondary electron preventing effect.

3 Claims, 2 Drawing Figures



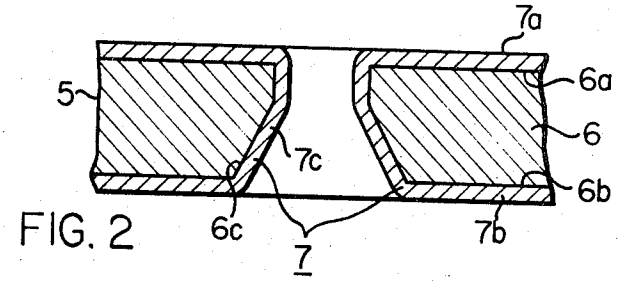


FIG. 2

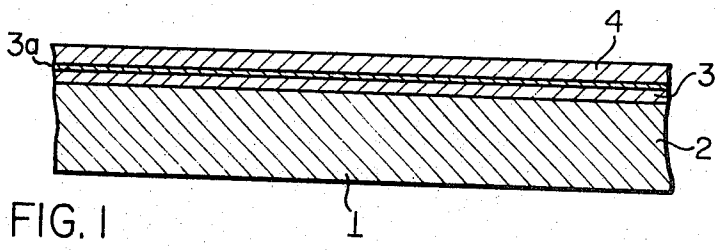


FIG. 1

POST-DEFLECTION ACCELERATION TYPE COLOR CATHODE-RAY TUBE

The present invention relates to a post-deflection acceleration type color cathode-ray tube having a secondary electron preventing layer.

Color cathode-ray tubes are known in the art in which the diameter of holes in the shadow mask is increased for improved brightness of the phosphor screen. However, such an increased diameter of the holes in the shadow mask increases the diameter of electron beams which impinge on the phosphor screen with the result that the electron beams tend to excite not only their relevant phosphor dots but also adjacent irrelevant phosphor dots, thereby making the color purity poor. In order to eliminate this drawback, a so-called post-deflection acceleration type color cathode-ray tube has been proposed in which an accelerating field is produced between the shadow mask and the phosphor screen to form an electron lens in the vicinity of the shadow mask for reducing the diameter of the electron beams which strike the phosphor screen. Color cathode-ray tubes of this type have such a disadvantage that the secondary electrons produced by electrons striking the phosphor screen, the shadow mask and/or the inner surface of the funnel portion are accelerated by the accelerating field produced between the phosphor screen and the shadow mask and the thus accelerated secondary electrons impinge on the phosphor screen, deteriorating reproduced color images and hence the color purity.

An object of the present invention is to provide a post-deflection acceleration type color cathode-ray tube which is free from the above-mentioned drawbacks and which comprises electron gun means, a shadow mask having through holes therein and a metal-backed phosphor screen, wherein a secondary electron preventing layer made of graphite is provided at least on that surface of the shadow mask which faces the electron gun means.

A better understanding of the present invention may be had from the following detailed description of a preferred embodiment when read in conjunction with the accompanying drawing of a preferred embodiment of the present invention wherein:

FIG. 1 is a cross-sectional view of a portion of the face panel of a cathode-ray tube; and

FIG. 2 is a cross-sectional view of a portion of the shadow mask positioned adjacent the phosphor screen of the cathode ray tube.

Referring now to the drawing, numeral 1 in FIG. 1 designates a panel portion comprising a panel plate 2, a phosphor screen 3 which is formed on the inner surface of the panel plate 2, and a metal-backing layer 3*a* of aluminum, for example, which is coated on the phosphor screen 3. Numeral 4 designates a layer of graphite coated on the metal-backing layer 3*a*. Numeral 5 in FIG. 2 designates a shadow mask portion including a shadow mask 6 arranged at a given distance from the phosphor screen 3 and containing a number of holes formed therethrough. Numeral 7 generally designates a coating of graphite and involves, in the illustrated embodiment, layer 7*a* coated on that surface 6*a* of the shadow mask 6 which faces the electron gun means (not shown), layer 7*b* coated on the other surface 6*b* of the shadow mask 6 which faces the panel portion 1 and

layer 7*c* coated on the inner surface 6*c* of the through hole in the shadow mask 6.

Coating of the graphite layers 4 and 7 may be performed by dispersing flake-like graphite particles having a particle diameter of about 1μ into a dispersion medium such as water or ethyl alcohol containing some organic binder such as ethyl cellulose, methyl cellulose or the like, the dispersion concentration of the graphite particles being about 1 to 10 percent by weight, preferably 6 to 8 percent by weight, and then spraying the thus obtained dispersion system by means of, for example, a spray gun onto the metal-backing layer 3*a* on the phosphor screen 3 and the electron gun-side face 6*a* and panel portion side face 6*b* of the shadow mask 6 to form thereon graphite layers having a uniform thickness of about 3 to 20μ. It is preferable that the density of the thus obtained layer 7 is about 0.3 to 2.25 g/cm^3 with the binder having been removed by a heat treatment. The heat treatment may be, for example, at 450°C for 1 hour in air. If the particle size of graphite particles and the density and thickness of the resultant graphite layer deviate considerably from these limits, the adhesion of the graphite particles and the strength of the resulting layers would be reduced. Also, the secondary electron preventing effect would be reduced, if the density and thickness of the graphite layers deviate considerably from the above-mentioned limits. The above-mentioned limits on the concentration of the dispersion system ensure a maximum efficiency of the spraying operation.

The graphite layers 4, 7*a*, 7*b* and 7*c* coated in the manner described can considerably reduce the degree of deterioration of the color purity. This effect can be further improved, if another graphite layer is also applied on the inner surface of the funnel portion (not shown). In this case, the graphite layer on the inner surface of the funnel portion does not require a strict uniformity in thickness such as is required for the graphite layers 4, 7*a*, 7*b* and 7*c*, so that it may be applied by a brush.

Any graphite layer having a density less than the range of density defined for the graphite layer of the present invention is inferior in its adhesion as well as its coating strength and thus it cannot be applied in practical use.

Furthermore, it should be noted that if the thickness of a graphite layer is considerably less than the lower limit of the above-mentioned range of thickness for the graphite layer, its secondary electron preventing effect is reduced, whereas if the thickness is considerably more than the upper limit of the range, its adhesion is reduced. Moreover, while in the embodiment described above the secondary electron preventing layers have been provided on the metal-backed phosphor screen and on both surfaces of the shadow mask and the walls of the holes therein, the intended object can be practically attained when a secondary electron preventing layer is provided at least on that surface of the shadow mask which faces the electron gun means. In case a secondary electron preventing layer is provided on the phosphor screen, a relatively thin thickness in the range of thickness defined according to the present invention may be effectively utilized for purposes of improved brightness.

It should also be appreciated that although the present invention has been illustrated and described as embodied in a color cathode-ray tube employing a shadow

mask, it is not intended to be limited thereto, since the present invention can be equally applied to a color cathode-ray tube of the type employing a grid aperture mask as well as other types of color cathode-ray tubes.

In conclusion, it is seen that the post-acceleration type color cathode-ray tube according to the present invention is highly effective in respect of its secondary electron preventing effect and the adhesive quality of its graphite layers.

What is claimed is:

1. In a post-deflection acceleration type color cathode-ray tube comprising electron gun means, a shadow mask having through holes therein and a metal-backed phosphor screen, the improvement comprising a secondary electron preventing layer made of graphite, said

layer being provided at least on that surface of said shadow mask which faces said electron gun means, the thickness and the density of said secondary electron preventing layer being in the ranges of about 3 – 20μ and about 0.3 – 2.25 g/cm^3, respectively.

2. The color cathode-ray tube according to claim **1**, wherein secondary electron preventing graphite layers are provided on both surfaces of said shadow mask and the walls of said through holes in said shadow mask, on said metal-backed phosphor screen and on the inner surface of the funnel portion of the tube.

3. The color cathode-ray tube according to claim **1**, wherein the graphite particles constituting said secondary electron preventing layer having a particle diameter of about 1μ.

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