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United States Patent

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[72] Inventor **Homer L. May**
Lancaster, Pa.

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[73] Assignee **RCA Corporation**
a corporation of Delaware

[54] **SHADOW MASK TYPE COLOR PICTURE TUBE WITH A FINE MESH FLEXIBLE PARTICLE SHIELD BETWEEN THE GUN AND TARGET PORTIONS**
1 Claim, 3 Drawing Figs.

[52] **U.S. Cl.** **313/70,** 313/83, 313/288
[51] **Int. Cl.** **H01j 29/50,** H01j 19/50
[50] **Field of Search** 313/70C, 92B, 77

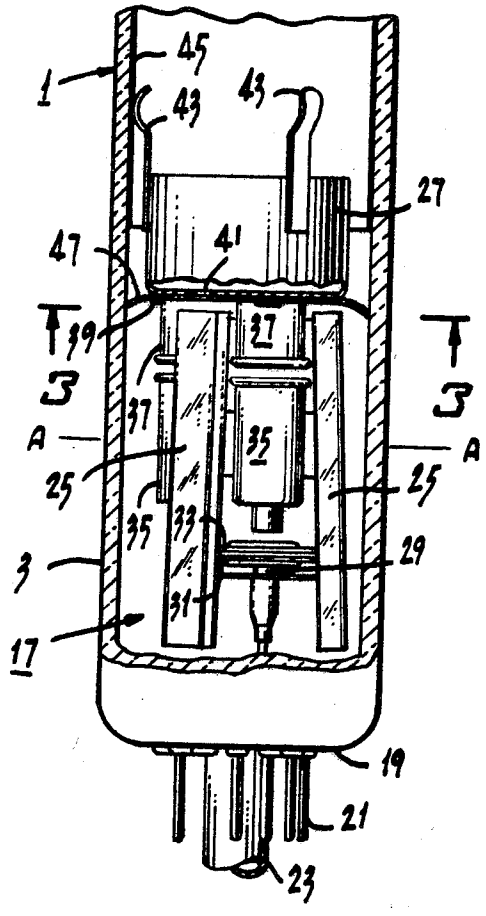
[56] **References Cited**
UNITED STATES PATENTS

2,073,715	3/1937	Stone et al.	313/288X
2,951,962	9/1960	Miller et al.	313/65AX
3,033,873	10/1961	Zworyking	313/92BX
3,183,388	5/1965	Townsend et al.	313/82
3,254,251	5/1966	Hughes	313/77X

Primary Examiner—Robert Segal
Attorney—Glenn H. Bruestle

ABSTRACT: A shadow-mask-type color picture tube, comprising a glass envelope including neck, funnel and target portions, a triple-beam electron gun structure mounted in the neck portion, a mosaic three-color phosphor screen on the inner wall of the target portion, and a multiapertured shadow mask mounted adjacent to the screen, is provided with a fine mesh flexible annular particle shield, e.g. of stainless steel mesh, attached to the gun and extending into continuous contact with the wall of the neck portion.

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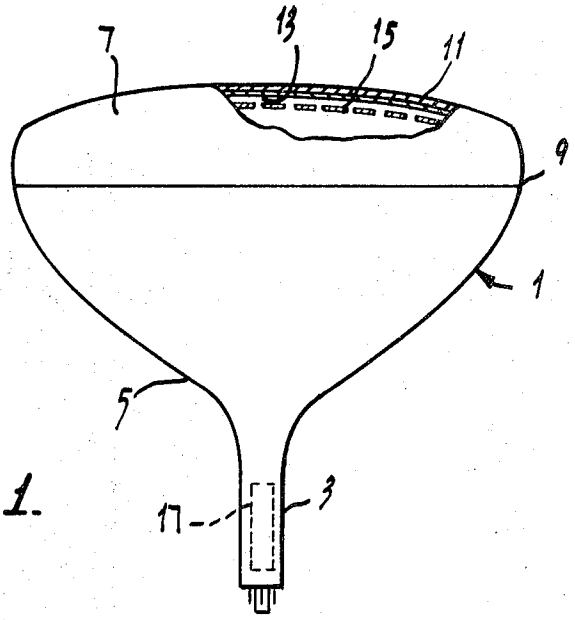


Fig. 1.

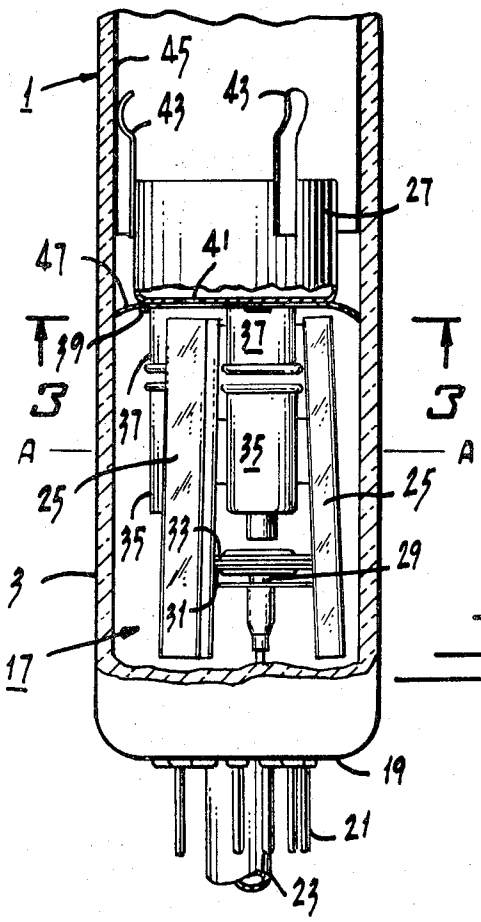


Fig. 2.

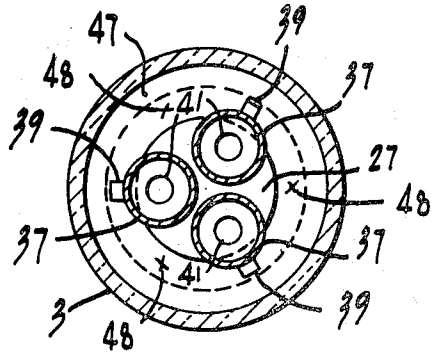


Fig. 3.

INVENTOR
HOMER L. MAY
BY Thomas R. Webb
AGENT

SHADOW MASK TYPE COLOR PICTURE TUBE WITH A FINE MESH FLEXIBLE PARTICLE SHIELD BETWEEN THE GUN AND TARGET PORTIONS

BACKGROUND OF THE INVENTION

This invention relates to color picture CR tubes of the shadow-mask type.

A typical shadow-mask color picture tube comprises a glass envelope including neck, funnel and target portions, and a gun structure mounted in the neck portion for projecting three electron beams toward the target portion which comprises a mosaic three-color phosphor screen deposited on the inside wall and a multiapertured shadow-mask mounted adjacent to the screen and in the paths of the three beams. One form of shadow mask color picture tube is disclosed in R. H. Hughes U.S. Pat. No. 3,254,251, granted May 31, 1966.

It has been noted that a substantial percentage of color tubes require scrapping and/or rebuilding because of mask apertures that have become blocked by particles, usually glass, from the stem, beads or neck glass. These particles sometimes originate during final tube processing, handling, packing or shipping, but a major source of such particles is produced by the regunning of tubes being salvaged. In the regunning operation, the stem portion of the neck of the tube is "cracked off" in a transverse plane roughly midway between the ends of the electron gun by a conventional process which generates a substantial amount of glass powder or particles in the gun region. It is very difficult, in the conventional gun, to remove all of these particles and thus prevent any of them from migrating to the mask and blocking the apertures thereof.

SUMMARY OF THE INVENTION

The gun structure of a color picture tube is provided with a fine mesh flexible particle shield extending from the gun structure to the inner wall of the tube neck. The particle shield may be of metal or a nonconducting material, such as fiberglas, suitable for use in a vacuum and capable of withstanding processing temperatures up to about 450° C.

BRIEF DESCRIPTION OF THE DRAWING

In the appended drawing:

FIG. 1 is a side view, partly in section, of a color picture tube embodying the present invention;

FIG. 2 is an enlarged side view, partly in axial section, of the neck portion of the tube of FIG. 1; and

FIG. 3 is a transverse section view taken on line 3–3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows generally a shadow-mask-type color picture tube 1 comprising a glass envelope including a neck portion 3 integral with a funnel portion 5, and a target portion or panel 7, the periphery of which is frit sealed at 9 to the funnel portion 5. The target portion 7 includes a viewing portion or faceplate 11, the inner surface of which is coated with a mosaic three-color phosphor screen 13. A multiapertured shadow mask 15 is mounted adjacent and in spaced relation to the screen 13. An electron gun structure or assembly 17 is mounted in the neck portion 3 to project three electron beams toward the mask 15 and screen 13. Conventional means (not shown) are associated with the tube for converging the three beams at the screen and for scanning the beams in a raster across the mask and screen.

The details of the neck portion 3 and electron gun structure 17 are shown in FIGS. 2 and 3. The neck portion 3 is closed at the lower end by a stem 19 having lead-in pins 21 and an exhaust tubulation 23 that is tipped off after tube exhaust.

The electron gun structure 17, shown for example, comprises three series of aligned electrodes, one for each beam, mounted on three glass rods or beads 25, and a cylindrical convergence cup 27. Each series of electrodes comprises a cathode 29, a control grid 31, a screen grid 33, an accelerating electrode 35, and a focusing electrode 37. The three focusing electrodes 37 are provided with tabs 39 for welding to the convergence cup 27 in alignment with relatively small beam apertures 41 therein. The convergence cup is made of nonmagnetic metal and contains conventional magnet pole pieces (not shown) for cooperating with external magnet means to converge the three beams at the screen. Three metal springs 43, welded to the cylindrical wall of the convergence cup 27 near its open end, contact a conductive coating 45 on the inner wall of the envelope, thereby electrically connecting the convergence cup 27 and the focusing electrodes 37 to the high or ultor voltage on the funnel and target portions and also mechanically supporting and centering the upper end of the gun 17 structure within the neck portion 3. The lower end of the gun structure 17 is supported on the stem 19 by conventional connections (not shown) between the various electrodes and the lead-in pins 21.

The tube 1 is provided with a flexible particle shield 47 which extends completely across the annular gap between the convergence cup 27 and the adjacent wall of the neck portion 3. As shown in FIGS. 2 and 3, the shield 47 comprises a thin annular member having its outer periphery continuously in contact with the neck wall and having its inner periphery clamped between the base of the convergence cup 27 and outer portions of the three focusing electrodes 37. The shield 47 may be a metal member that is first centrally positioned on the base of the convergence cup 27 and welded thereto at points 48 intermediate to the three electrodes 37. Then the electrodes 37, which have been previously assembled with the glass beads 25 and other electrodes, may be aligned with the apertures 41 and welded, through the shield 47, to the cup 27 by means of the tabs 39.

The shield 47 should be of nonmagnetic material to avoid influencing the magnetic convergence fields associated with the convergence cup 27. The initial external diameter of the shield should be at least equal to, and preferably slightly greater than, the inner diameter of the neck portion 3, to insure continuous firm contact with the glass wall. The shield must be flexible enough to prevent damage to the glass wall with changes in temperature, but resilient enough to maintain contact with the glass wall and prevent glass and other particles from passing from the gun region through the annular gap to the funnel and target portions of the tube. The shield may be either imperforate or a fine mesh made of any metal or nonmetal having the physical properties described and capable of withstanding normal tube processing conditions up to about 450° C., such as steel, aluminum, fiberglass etc. A material that has proven satisfactory is a stainless steel mesh having approximately 200 × 200 wires per inch and a thickness of about 2 mils. A mesh having at least 150 × 150 wires per inch and a thickness of 1 to 5 mils should be satisfactory.

The particle shield 47 will prevent glass or other particles originated in the gun region during tube processing, handling, packing or shipping from migrating through the annular gap between the convergence cup 27 and the neck wall 3 to the target portion 7. It is, of course, possible for some particles to pass through the small apertures 41 in the cup 27, but this appears to be only a minor cause of blocked mask apertures, and cannot be avoided. The shield 47 is particularly useful when a tube fails after a period of use due to a faulty gun and is salvaged by regunning. In this operation, a part of the neck portion 3 is "cracked-off," usually approximately in the plane A–A shown in FIG. 2, producing substantial amounts of glass powder or larger particles within the gun region. When the gun structure 17 is removed, the gun and the shield 47 together remove substantially all of the glass particles produced during crack-off. Thereafter, a new lower neck part is sealed to the upper neck part and a new gun mount, including a new stem, is inserted into and sealed to the new neck part.

I claim:

1. A shadow-mask-type color picture tube comprising:

a. an evacuated envelope including a cylindrical neck portion, a funnel portion, and a faceplate panel portion;

b. a mosaic color phosphor screen on said panel portion;

c. a multiapertured shadow-mask electrode mounted in said envelope adjacent to said screen;

d. an electron gun structure mounted in said neck portion for projecting three electron beams towards said mask electrode and screen, said gun structure including:

1. a cylindrical cup-shaped convergence member having a plurality of small apertures in the base of the cup for the passage of said beams, the outer periphery of said convergence member being spaced from the inner wall of said neck portion by an annular gap; and

2. three series of aligned cathode, modulating, accelerating and focusing electrodes, each series terminating in a tubular focusing electrode located adjacent and attached to the base of said cup-shaped convergence member; and

e. a nonmagnetic, flexible, fine mesh, annular shield of stainless steel, having at least 150 × 150 wires/inch and a thickness of 1 to 5 mils, extending between and continuously contacting said convergence member and the inner wall of said neck portion, for preventing particles from passing through said annular gap toward said shadow mask electrode, the inner periphery of said annular shield being clamped between said base and portions of said tubular electrodes.