June 29, 1954 E. SANFORD 2,682,620

CATHODE-RAY TUBE

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Fig. 1

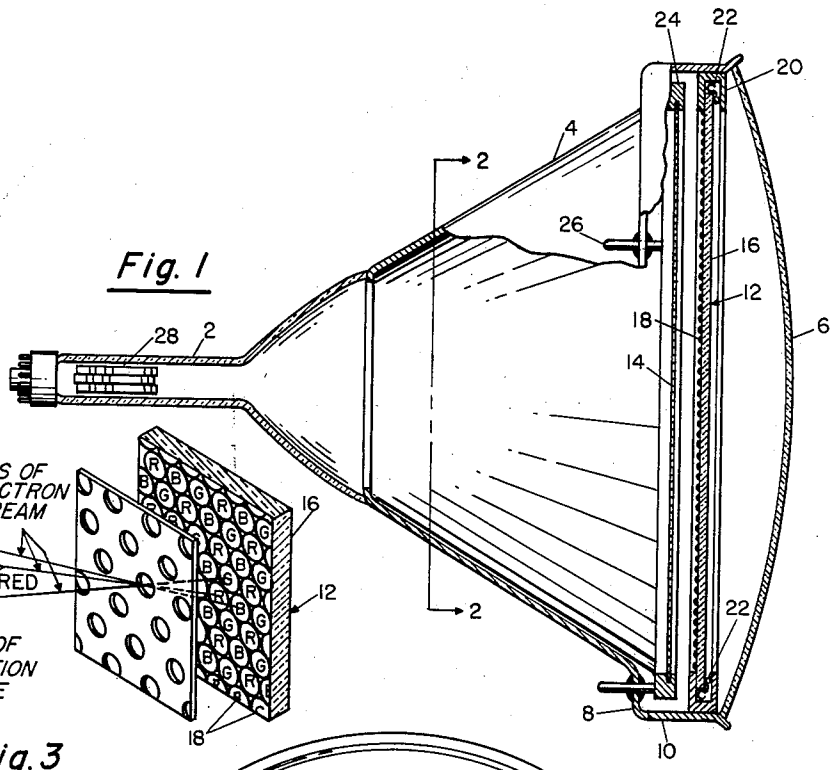
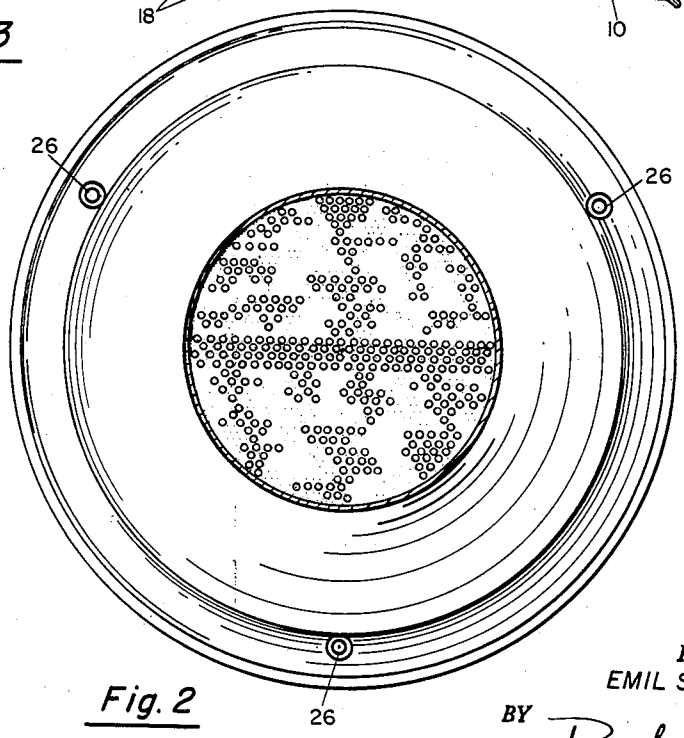


Fig. 3

Fig. 2



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CATHODE-RAY TUBE

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8 Claims. (Cl. 313—70)

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The present invention relates to cathode-ray tubes and particularly to color-image reproducing cathode-ray tubes.

In cathode-ray tubes utilizing a plurality of electron guns and phosphors of different light generating characteristics to reproduce images in color, a perforated mask is generally interposed between the electron guns and the phosphor areas in such a manner that each of the respective phosphor areas of different light generating characteristics are exposed to the cathode-ray beam of only one of the plurality of guns. Obtaining suitable alignment of the mask heretofore has been a slow, expensive manual operation not suitable to the mass assembly of such tubes.

Accordingly, it is an object of the present invention to provide an improved cathode-ray tube of the color-image reproducing type utilizing a perforated mask, the alignment of which may be obtained with considerably more speed and economy.

Another object of the present invention is to provide a cathode-ray tube of the color-image reproducing type wherein the alignment of the mask may be made by means external to the tube.

These and other objects of the present invention may be obtained in accordance with the present invention by providing a cathode-ray tube having the perforated mask suspended in the tube by means passing through the tube envelope and adjustable externally of the tube.

For a better understanding of the invention reference may be had to the drawing in which Figure 1 is a view of a cathode-ray tube embodying the present invention with parts of the tube illustrated in cross-section and parts broken away; Figure 2 is a view of the cathode-ray tube of Figure 1 taken along the line 2—2 and Figure 3 is an enlarged fragmentary view of the fluorescent screen and mask of the tube.

Referring now to the drawing and particularly to Figure 1 there is illustrated a cathode-ray tube comprising an envelope which consists of a glass neck portion 2 flaring outwardly at one end where it is joined to a metal cone portion 4 having a glass face plate 6 enclosing its enlarged end. The metal cone portion 4 is provided with radially and axially extending flange portions 8 and 10 respectively within which there is supported the fluorescent screen 12 and a perforated mask 14.

The fluorescent screen 12 comprises a support plate 16 which is usually of glass or some similar suitable transparent material on which there is formed on the side of the support exposed to the electron beams of the tube, a plurality of phosphor areas 18 of red, blue and green fluorescent characteristics arranged to form triads as illutrated in Figure 3. The fluorescent screen 12 is

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supported in an annular ring 20 which is supported against the inner wall of the axially extending flange portion 10. Spring clips 22 hold the fluorescent screen in the annular ring.

The perforated mask 14 comprises a perforated circular metal plate supported in an annular ring 24. The ring and perforated plate are suspended in the space of the cone defined by the radially and axially extending flanges 8 and 10 by means of a plurality of elongated pins 26. The pins are secured to the annular ring 24 and extend through the radially extending flanged portion, as shown. Where the pins 26 pass through the flange they are secured thereto in some suitable manner, as by welding, and have a portion thereof exposed externally of the tube envelope. The perforated mask 14 is provided with apertures which are equally spaced with a single aperture for each of the dot triads comprising the primary red, blue and green color phosphors.

Mounted in the neck portion 2 of the tube there are a plurality of electron guns 28 for directing beams of electrons against the fluorescent screen. As shown, there is an electron gun for each of the different color phosphors. The electron guns 28 are aligned in the tube so that the electron beams of the guns are focused on the perforated plate 14. As will be seen from Figure 3, with this arrangement of the guns, each gun will be aligned to project an electron beam through the apertures of the perforated mask to bombard one of the color phospors dots of the triads.

To obtain suitable alignment of the perforated mask in the tube, the exposed ends of the pins 26 may be moved about the point of juncture, or welded joint of the pin with the metal cone. This movement being slight in order to obtain alignment will not overstress the joint so as to cause leakage. The adjustment of the mask through movement of the pins may be obtained by a manual manipulation of the ends of the pins or by a jig fixture adapted to be fitted around the metal cone of the tube.

It will be seen that with a device such as I have described herein, there is eliminated the careful and tedious adjustments prior to assembly of the tube.

What I claim is:

1. A cathode-ray tube comprising an envelope, a fluorescent screen positioned in said envelope, an electron gun positioned in said envelope, a perforated mask positioned in said envelope between said electron gun and said screen, and means fixedly attached to said mask internally of said envelope and extending from said mask through said envelope and externally thereof whereby the position of said mask may be adjusted to a fixed position by manipulation of that portion of said means externally of said tube.

2. A cathode-ray tube comprising an envelope

having a neck portion, a fluorescent screen positioned in said envelope, an electron gun positioned in said neck portion, a perforated mask positioned in said envelope between said electron gun and said screen and means fixedly attached to said mask internally of said envelope and extending from said mask through said envelope and externally thereof whereby the position of said mask may be adjusted to a fixed position by manipulation of that portion of said means externally of said tube.

3. A cathode-ray tube comprising an envelope having a neck portion, a fluorescent screen positioned in said envelope, an electron gun positioned in said neck portion, a perforated mask positioned in said envelope between said electron gun and said screen and means fixedly attached to said mask internally of said envelope and extending from said mask through said envelope and externally thereof whereby the position of said mask may be adjusted to a fixed position by manipulation of that portion of said means externally of said tube.

4. A cathode-ray tube comprising an envelope having a neck portion, a fluorescent screen positioned in said envelope, a plurality of electron guns positioned in said neck portion, a perforated mask positioned in said envelope between said electron guns and said screen and an elongated member fixedly attached to said mask internally of said envelope and extending from said mask through said envelope and externally thereof whereby the position of said mask may be adjusted to a fixed position by manipulation of that portion of said elongated member externally of said tube.

5. A cathode-ray tube comprising an envelope having a neck portion, a fluorescent screen positioned in said envelope said screen including a plurality of different color phosphor areas, a plurality of electron guns disposed in said neck portion, one electron gun for each of said different color phosphor areas, a perforated mask positioned in said envelope between said screen and said guns, and a plurality of elongated members fixedly attached to said mask internally of said envelope and extending therefrom through said envelope and externally thereof said members being secured to said envelope by means stressable to permit adjustment of said mask to a fixed position by movement of said elongated members externally of said envelope.

6. A cathode-ray tube comprising an envelope having a glass neck portion and a metal portion sealed thereto, a fluorescent screen positioned in said metal portion, a plurality of electron guns positioned in said neck portion, a perforated mask positioned in said metal portion between said screen and said electron guns and a plurality of elongated metallic members fixedly attached in spaced relation to said mask internally of said envelope and extending through said metal portion and externally thereof, said members being joined to said metal portion by a welded junction to prevent leakage at the juncture said junction being stressable to permit manipulation of said members externally of said tube to adjust the position of said mask to a fixed position therein.

7. A cathode-ray tube comprising an envelope having a glass neck portion and a metal conical portion sealed thereto, a fluorescent screen positioned in said conical portion said screen comprising a plurality of contiguous phosphor areas of different fluorescent color characteristics arranged symmetrically in triads on said screen, a plurality of electron guns disposed in said neck portion, one gun for each of said color phosphors, a perforated mask positioned in said envelope between said screen and said gun said mask having perforations, one for each of said triads, and a plurality of elongated metallic members fixedly attached in spaced relation to said mask internally of said envelope and extending through said conical portion and externally thereof, said members being joined to said conical portion by a welded junction to form a sealed joint stressable to permit manipulation of said members externally of said tube to adjust the position of said mask to a fixed position therein.

8. A cathode-ray tube comprising an envelope having a glass neck portion and a metal conical portion sealed thereto, said metal conical portion having a radially extending flange, a fluorescent screen positioned in said conical portion adjacent said flange, said screen comprising a plurality of contiguous phosphor areas of different fluorescent color characteristics, an electron gun disposed in said neck portion, an apertured mask positioned in said envelope adjacent said flange and between said screen and said gun, and a plurality of elongated rods having one end fixedly attached to said mask at substantially equi-distant positions and extending substantially perpendicularly therefrom and substantially perpendicularly through said flange and externally thereof, said rods being secured at a position intermediate the ends thereof to said flange by a welded junction to form a sealed joint, said welded junction being stressable by manipulations of the end external of said rods to adjust the position of said mask in said envelope.

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