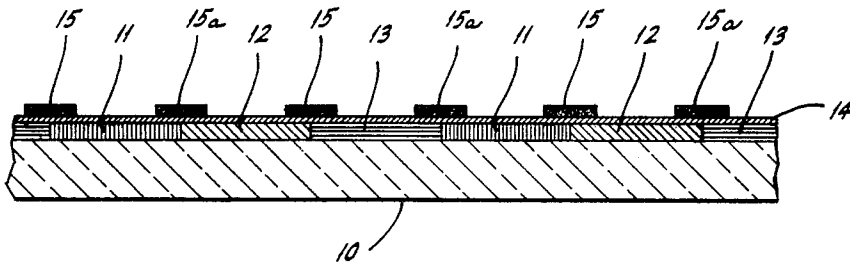
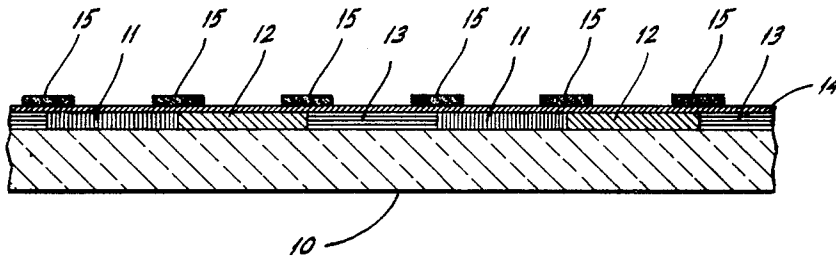


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SCREEN STRUCTURE FOR COLOR IMAGE-PRODUCING CATHODE
RAY TUBES OF THE INDEX TYPE
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FIG. 1.



15 - ACTIVE STRIPES
15a - RELATIVELY INACTIVE STRIPES

FIG. 2.

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SCREEN STRUCTURE FOR COLOR IMAGE-PRODUCING CATHODE RAY TUBES OF THE INDEX TYPE

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2 Claims. (Cl. 313-89)

This invention relates to screen structures for color image-producing cathode ray tubes of the index type, wherein the color image is produced by successive and repetitive electron beam scanning of elements emissive of light of different primary colors, such as red, green and blue, and wherein an index signal is also produced which is utilized to effect coordination between instantaneous beam modulation and beam position, such coordination being essential for proper color rendition. Such cathode ray tubes are now well known. They are useful, for example, in color television receivers.

The screen structure of a tube of this type preferably comprises phosphor stripes in successive triplets which extend transversely to the direction of line scanning motion of the electron beam, the stripes of each triplet being successively emissive of light of different primary colors, e.g. red, green and blue, as the beam traverses them. The scanning of each color triplet represents one color cycle. The "color writing" frequency is the nominal rate at which the writing beam traverses the color triplets, i.e. the number of triplets traversed per second. By way of example, this frequency may be 6 mc.

The index signal is produced by electron beam impingement of index elements which may also be in the form of stripes extending transversely to the direction of line scanning. They may be composed of a fluorescent material, such as zinc oxide, having a spectral output in the non-visible light region, and the index signal may be derived from a suitable photo-electric cell arranged, for example, in a sidewall portion of the cathode ray tube out of the path of the electron beam and facing the screen structure. Alternatively, the index signal may be produced by secondary electron emission as well understood in the art.

In the manufacture of screen structures of the index type, the colored light-emissive elements and the index elements are preferably deposited by the photo-deposition method as known in the art, but they may be deposited by any other suitable method.

In a desirable form of such screen structure, the colored light-emissive stripes are deposited on a transparent substrate which may be the faceplate of the cathode ray tube, and an electron-permeable light-reflecting layer, preferably formed of aluminum, is applied to said stripes. The index stripes are deposited on said layer. This type of screen structure is also well known.

In an improved form of such structure, as disclosed and claimed in Patent No. 2,842,697, issued July 8, 1958, to F. J. Bingley, assigned to the assignee of the present application, the colored light-emissive stripes are spaced apart and so-called guard stripes are provided in the spaces between the light-emissive stripes. These guard stripes are opaque and non-reflecting. In such a structure the light-emissive stripes are individually defined and impingement of the scanning electron beam on more than one light-emissive stripe at a time is substantially prevented. This structure also has other advantages as set forth in said Bingley patent.

In such a structure, the index stripes may be disposed behind the guard stripes so as not to "shadow" the light-emissive stripes, i.e. so as not to reduce the electron impingement on the light-emissive stripes which would de-

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grade the color picture. However, a screen structure of this character requires precise alignment or registry between the index stripes and the guard stripes. This imposes a very close tolerance on the manufacture of the screen structure since any misregistry between the index stripes and the guard stripes would tend to defeat the purpose of having the index stripes behind the guard stripes.

The principal object of the present invention is to overcome this difficulty and to provide an improved screen structure which eliminates the necessity of close registry between elements of the structure.

Another object of the invention is to provide a screen structure which is relatively simple in construction and which permits broad manufacturing tolerances, and is therefore more economical to construct.

Other objects and features of the invention will be apparent from the description to follow.

In accordance with this invention the index stripes are caused to serve both as index elements and as guard stripes between the colored light-emissive stripes. The latter stripes are disposed in contiguous relation to one another, preferably in abutting relation, and each index stripe is adjacent to and overlaps portions of two consecutive colored light-emissive stripes. The index stripes are made sufficiently thick so that they are substantially impervious to the electrons, in order that they may serve as guard stripes in addition to serving as index stripes in the performance of their normal function of generating the index signal.

The invention may be fully understood from the following detailed description with reference to the accompanying drawings wherein

FIG. 1 is a greatly enlarged fragmentary sectional plan view of one form of color image-producing screen structure according to this invention; and

FIG. 2 is a similar view of a modified form of screen structure according to the invention.

Referring first to FIG. 1, there is shown a transparent substrate 10 which may be the faceplate of a colored image-producing cathode ray tube or an image plate in proximity to the faceplate. Deposited on said substrate are colored light-emissive stripes in contiguous relation to one another, preferably in abutting relation. Red light-emissive stripes are shown at 11, green light-emissive stripes are shown at 12, and blue light-emissive stripes are shown at 13. The said stripes preferably are substantially equal in width. Since each color triplet represents one color cycle of 360 color degrees, each of said stripes may have a width of 120 color degrees. An electron-permeable light-reflecting layer 14, which may be formed of aluminum, is applied to the colored light-emissive stripes. Index stripes 15 are deposited on layer 14 so that each of the index stripes is adjacent to and overlaps portions of two consecutive colored light-emissive stripes. By way of example, each index stripe may have a width of 50 color degrees and may extend 25 color degrees on each side of the line of abutment of the two adjacent colored light-emissive stripes. The index stripes are sufficiently thick so that they are substantially impervious to electrons, in order that they may also serve as guard stripes.

With this structure there is no requirement of very close registry or alignment between elements. The index stripes could be displaced in either direction by as much as 25 color degrees before the displacement would have any noticeable effect.

In this structure the index stripes serve both as index elements and as guard stripes. Thus the guard stripes previously used in spaces between the light-emissive stripes are eliminated and the structure is simplified. Moreover, in this structure the effective width of the col-

ored light-emissive stripes is not reduced. While the index elements overlies portions of the colored light-emissive stripes, such portions thus being rendered ineffective, the effective portions are as wide as are the colored light-emissive stripes in the prior structure having spaces to accommodate guard stripes.

In the screen structure of FIG. 1 there are three index stripes for each color triplet, and therefore the index signal produced by electron beam impingement of the index stripes has a frequency which is the third harmonic of the color writing frequency. However, other index frequencies may be produced by modification of the screen structure. For example, a $3/2 f$ index frequency (f being the color writing frequency) may be produced by causing alternate ones of the stripes to be active and the other alternate ones to be relatively inactive, although, of course, the inactive stripes will still serve as guard stripes. Thus in FIG. 2, which shows the same screen structure except for this modification, the alternate stripes 15 are active and the other alternate stripes 15a are relatively inactive in that they do not contribute to the index signal. One way of achieving this result is to deposit the stripes 15 and 15a in separate applications, using activated phosphor for the stripes 15 and inactivated phosphor for the stripes 15a. Another way is to deposit all of the stripes in one application using activated phosphor, and then apply to the stripes 15a a material, such as aluminum, which is transparent to the electron beam but opaque to the index phosphor radiation, thus masking stripes 15a from the index sensing means. Still another way would be to apply to the alternate stripes 15a a material that would poison them in such a way as to reduce their emission of radiation. Still another way is to deposit all of the stripes in one application using inactive material, and then apply active material to stripes 15 to render them

active. In any case it is not necessary that the stripes 15a be totally inactive. As long as they are substantially less active than stripes 15, the latter will produce a $3/2 f$ index signal as the electron beam scans across the screen.

While certain forms of screen structure according to this invention have been illustrated and described, it will be understood that the invention is not limited thereto but contemplates such modifications and other embodiments as may occur to those skilled in the art.

I claim:

1. An image screen for a color image-producing cathode ray tube, comprising a transparent substrate, parallel colored light-emissive stripes supported by said substrate in closely adjacent relation to one another for transverse scanning by an electron beam, said stripes being successively and repetitively emissive of light of different colors in response to electron beam impingement, an electron-permeable light-reflecting layer on said stripes extending over the entire image area of said screen, and relatively narrow electron-impervious stripes on said layer adjacent to and coextensive with the respective facing edges of said light-emissive stripes and overlapping portions of the latter stripes immediately adjacent the facing edges, at least some of said electron-impervious stripes being constituted to emit energy to produce an index signal in response to electron beam impingement.

2. An image screen according to claim 1, wherein said colored light-emissive stripes are disposed in abutting relation to one another.

References Cited in the file of this patent

UNITED STATES PATENTS

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