United States Patent [19]

Yamazaki et al.

[11] **3,745,397**

[45] **July 10, 1973**

[54] **PYRAMIDAL GUN ARRAY HAVING RESILIENT MEMBER CONTACTING CORRESPONDING SUPPORTS OF EACH OF THREE GUNS**

[75] Inventors: **Eiichi Yamazaki; Yukihiro Izumida; Masanori Hirai,** all of Mobara-shi, Japan

[73] Assignee: **Hitachi, Ltd.,** Tokyo, Japan

[22] Filed: **June 28, 1971**

[21] Appl. No.: **157,612**

Related U.S. Application Data

[63] Continuation of Ser. No. 776,025, Nov. 15, 1968, abandoned.

[30] **Foreign Application Priority Data**

Nov. 24, 1967 Japan 42/98451
Nov. 27, 1967 Japan 42/99159

[52] **U.S. Cl.** ..... **313/70 C,** 313/77, 313/257
[51] **Int. Cl.** **H01j 29/50,** H01j 29/02
[58] **Field of Search** ..... 313/69, 69 C, 70, 313/70 C, 77, 92 B

[56] **References Cited**

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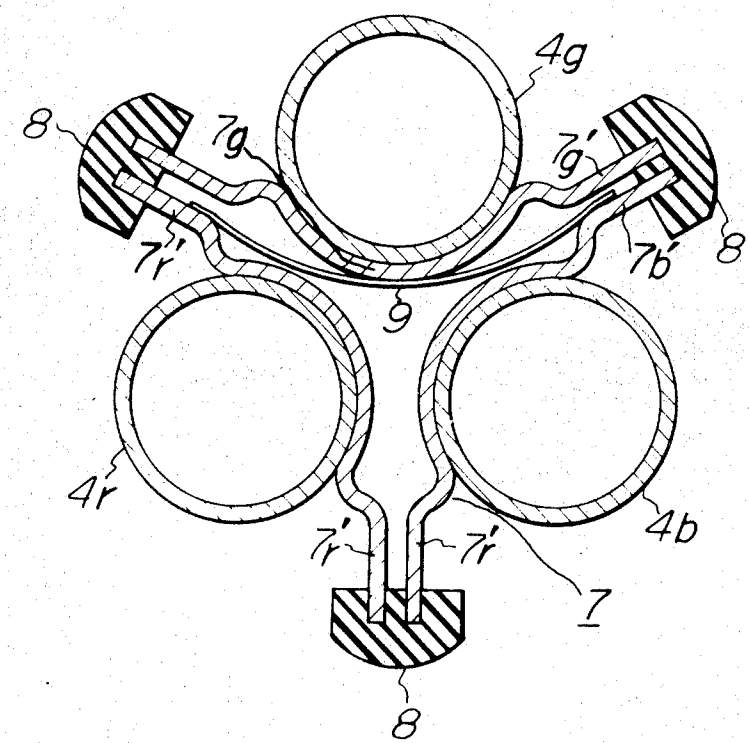
Primary Examiner—Robert Segal
Attorney—Craig, Antonelli & Hill

[57] **ABSTRACT**

There is disclosed a color picture tube having three electron gun units arranged in the form of a trigonal pyramid or prism within the neck of the tube, the corresponding electrodes of the respective electron guns, which are to be held at the same potential, being electrically connected mutually with a contact strip.

3 Claims, 4 Drawing Figures



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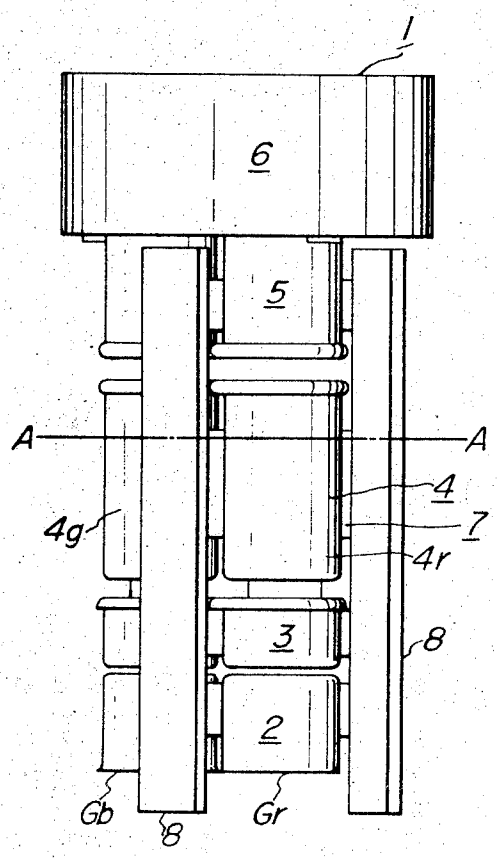


FIG. 1

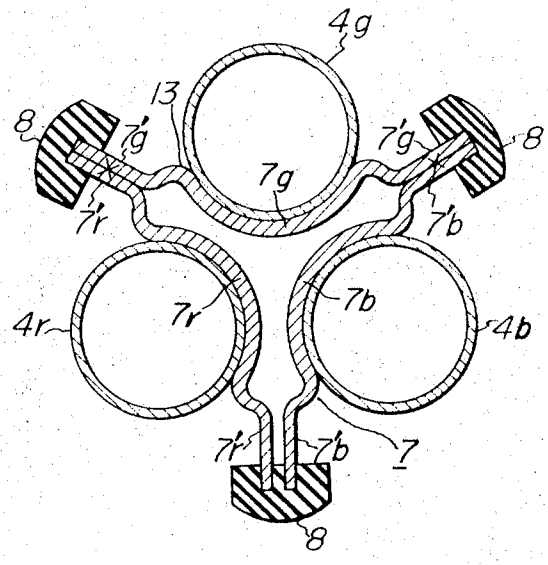


FIG. 2

INVENTORS
EIICHI YAMAZAKI
YUKIHIRO IZUNIDA
HASANORI HIRAI
BY
Craig & Antonelli
ATTORNEYS

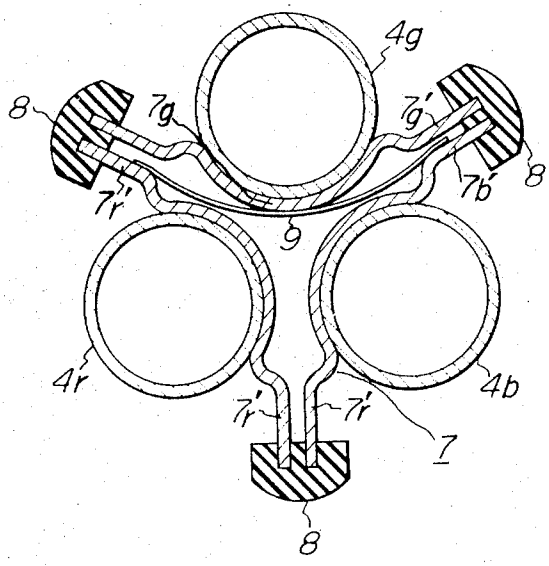
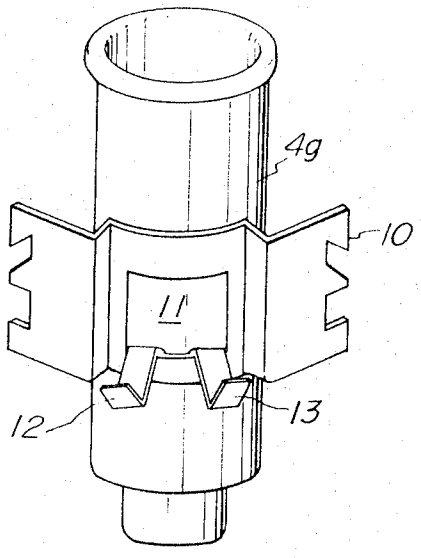


FIG. 3

FIG. 4



INVENTORS
EIICHI YAMAZAKI
YUKINIRO IZUMIDA
MASANORI HIRAI
BY
Craig & Antonelli
ATTORNEYS

PYRAMIDAL GUN ARRAY HAVING RESILIENT MEMBER CONTACTING CORRESPONDING SUPPORTS OF EACH OF THREE GUNS

This application is a continuation of application Ser. No. 776,025, filed Nov. 15, 1968, now abandoned.

This invention relates to an improvement of a color picture tube such as the shadow mask type color picture tube, particularly to an improvement in the structure of the electron gun assembly comprising three electron gun units arranged in the form of a trigonal pyramid or prism within the neck of the tube, said improvement consisting in electrically connecting the corresponding electrodes of the respective electron guns mutually with a contact strip in order to maintain the electrodes at the same potential in each group of corresponding electrodes.

The object, constitution and effects of this invention will be clarified by the following description which is made with reference to the accompanying drawings, in which:

FIG. 1 is an elevation of the conventional three gun structure;

FIG. 2 is a horizontal sectional view along line A—A of the structure shown in FIG. 1;

FIG. 3 is a view of an embodiment of this invention corresponding to the view of FIG. 2; and

FIG. 4 shows an essential portion of another embodiment of this invention.

Now, referring to FIG. 1, the conventional electron gun assembly 1 consists of three electron gun units Gr, Gb and Gg (Gg is not seen in FIG. 1.) respectively related to red, blue and green, each gun comprising No. 1 grid (or grid electrode) 2, No. 2 grid 3, No.3 grid 4 and No. 4 grid 5. These three electron guns are assembled in such a manner that their axes form a trigonal pyramid or prism and provided with a convergence pole piece cage 6 in common. The component grids of the respective electron gun units are secured to insulating holder members 8 by means of support members 7 to maintain the positional relations with the required accuracy.

As is seen in FIG. 2, similar grids of the respective gun units are associated with a set of support members. For example, in FIG. 2, No. 3 grids 4_r, 4_b and 4_g respectively belonging to the red, blue and green guns are supported by support members 7.

Each of the support members 7 comprises, as shown, for example, in FIGS. 6 and 7 of the U. S. Pat. No. 3254251, an arcuate mid portion 7_r, 7_b or 7_g for receiving the No. 3 grid 4_r, 4_b or 4_g respectively, and two end sections $7'_r$, $7'_b$ or $7'_g$ and is welded to said grid 4_r, 4_b or 4_g in said mid portion 7_r, 7_b or 7_g respectively. The end sections $7'_r$, $7'_b$ or $7'_g$ of the support member 7 are embedded in the insulating holder members 8. After the relative position of the three electron gun units is fixed so that the axes of the respective gun units cross at the inner surface of the face plate (not shown), the support members 7 are mutually connected by being spot-welded at two spots in the end sections in order to ensure that the grids 4_r, 4_b and 4_g are at the same potential. This is the usual practice in assembling an electron gun assembly for a color picture tube.

However, the mutual connection of the support members by welding has the following disadvantages: (1) it introduces an additional step in the manufacturing process of the assembly; (2) it makes it inevitable for the electrodes or grids to undergo a stress at the time of the welding, which will cause misalignment of the electron guns, resulting in an excessive convergence adjustment or an unsatisfactory focusing character; and (3) it makes difficult the disassembly of the electron guns for reuse of the guns.

An object of this invention is to remove the above-mentioned disadvantages and to provide a color picture tube of more reliable characteristics.

Another object of this invention is to provide a color picture tube of improved quality.

A further object of this invention is to provide a color picture tube which can be easily manufactured in less man-hours.

A still further object of this invention is to provide a color picture tube which can be readily disassembled for reuse of the electron guns when necessary.

In order to attain the above-mentioned objects, the electron gun assembly of this invention comprises the three electron guns 4r, 4b and 4g arranged in the form of a trigonal pyramid or prism and at least one conductive resilient contact piece 9 secured to one of the corresponding electrodes of each of said electron guns and resiliently contacting the other corresponding electrodes of said electron guns through the support members supporting the electrodes, as shown in FIG. 3. The above-mentioned contact piece 9 can be a strip or a wire made of a resilient material such as cold rolled stainless steel, as shown in FIG. 3. The mid portion of the contact piece 9 is secured to one of the support members by spot-welding, for example, at the portion 7_g of the support member 7 attached to the electrode 4_g, and both end portions of said contact piece 9 are in contact, by the resilient nature thereof, with the end portions 7_r and 7_b of the other support member 7 attached to the electrodes 4_r and 4_b respectively.

It is needless to say that the support member to which the contact piece 9 is secured may be any one of the three. In FIGS. 2 and 3, corresponding components are indicated by similar reference numerals.

Referring to FIG. 4 which shows another embodiment of this invention, tongues 12 and 13 are cut out, making an opening 11, from the mid portion of a support members 10 which is secured to the grid electrode 4_g. In the assembled three gun structure (not shown), the tongues 12 and 13 will be in contact with the electrodes 4_b and 4_g, thereby ensuring the electrodes 4_r, 4_b and 4_r to be at the same potential.

It will be understood that the support member 10 having the tongues 12 and 13 may be attached to any of the No. 3 electrodes in the above embodiment.

As described above, according to this invention in which three similar grid electrodes are electrically connected without being mutually welded, there is no possiblity for the dimensional accuracy of the assembled electron guns to be impaired by the effect of welding. Further, the gun assembly of this invention makes easy the reuse of the electron guns. Thus, according to this invention, an electron gun assembly which is reliable in quality and easy in manufacture is obtained by the use of a simple contact piece.

In the above description, only the mutual connection between No. 3 grid electrodes 4_r, 4_b and 4_g has been discussed. However, it will be obvious that the same means are applicable to the other electrodes if necessary.

We claim:

1. An electron gun assembly for a color picture tube comprising three multi-electrode electron guns arranged in the form of a trigonal pyramid, a conductive support member for each of said electron guns having an arcuate electrode receiving portion at the middle thereof and respective angularly extending end portions, one corresponding electrode of each electron gun being secured to the arcuate middle portion of a respective support member, the extending end portions of said support members being held in pairs by respective insulating holder members so that the support members for supporting the corresponding electrodes are positioned in said trigonal pyramid configuration and angularly displaced by 120° from each other with the convex surfaces of said arcuate portions being inwardly directed around the center axis of said pyramid configuration thereby having an interior space between said support members, and a conductive resilient member for electrically connecting and placing said support members at the same potential; said conductive resilient member being attached within said interior space to the convex surface of one of said support members at the middle portion thereof and biased in an arcuate

shape between said convex surface and the extending end portions of the other two support members nearest said one support member thereby to physically press against said end portions of the support members in the vicinity of the insulating holder members.

2. The combination defined in claim 1, wherein said conductive resilient member consists of a strip of a resilient material secured at its mid portion to the support member which is secured to said one corresponding electrode and resiliently contacting at its each end portion each of the other support members which are respectively secured to the other corresponding electrodes.

3. The combination defined in claim 1, wherein said conductive resilient member consists of a wire of a resilient material secured at its mid portion to the support member which is secured to said one corresponding electrode and resiliently contacting at its each end portion each of the other support members which are respectively secured to the other corresponding electrodes.

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