United States Patent [19]

Nakamura et al.

[11] **3,823,336**

[45] **July 9, 1974**

[54] **SHADOW MASK SUPPORT STRUCTURE INCLUDING A PLURALITY OF BIMETALLIC ELEMENTS FOR EACH LEAF SPRING**

[75] Inventors: **Hiroto Nakamura,** Takatsuki; **Ken-Ichi Doi,** Kobe; **Akira Sato,** Takatsuki; **Yushin Suzuki,** Amagasaki, all of Japan

[73] Assignee: **Matsushita Electronics Corporation,** Osaka, Japan

[22] Filed: **Feb. 10, 1972**

[21] Appl. No.: **225,307**

Related U.S. Application Data

[62] Division of Ser. No. 19,945, March 16, 1970, Pat. No. 3,660,708.

[30] **Foreign Application Priority Data**

Mar. 19, 1969 Japan 44-21833
Mar. 19, 1969 Japan 44-21834

[52] **U.S. Cl.** ..... **313/85 S,** 313/292

[51] **Int. Cl.** ... **H01j 29/06,** H01j 31/20, H01j 29/08

[58] **Field of Search** ..... 313/85 S, 292, 92 P

[56] **References Cited**

UNITED STATES PATENTS

3,449,611	6/1969	Schwartz et al.	313/85 S
3,524,973	8/1970	Rigdon	313/292 X

Primary Examiner—Robert Segal
Attorney, Agent, or Firm—Stevens, Davis, Miller & Mosher

[57] **ABSTRACT**

In a shadow mask support means comprising a bi-metal piece having one end secured to a shadow mask frame with the other end left free, and a leaf spring secured at one end to said free end of the bi-metal piece and extending therefrom toward a pin provided on a side wall of a face panel, the improvement residing in that a metallic plate portion disposed between said frame and said spring is so arranged that it is displaced due to thermal deflection of the bi-metal at the end adjacent to said pin by an amount smaller than the displacement at the opposite end.

1 Claim, 3 Drawing Figures

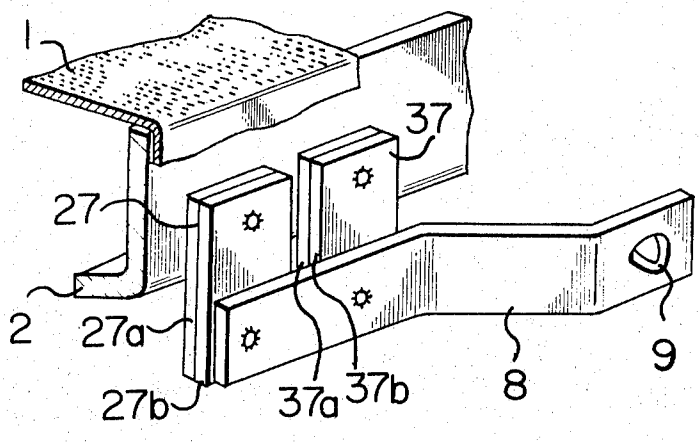


FIG. 1

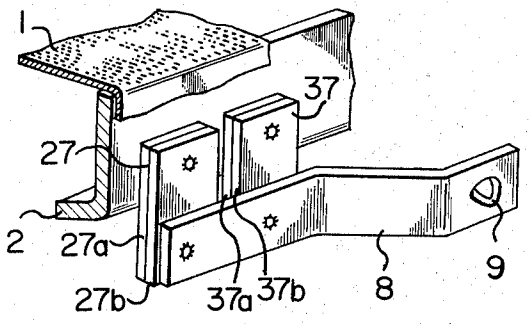


FIG. 2

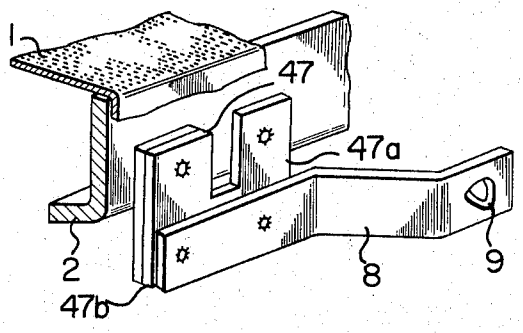
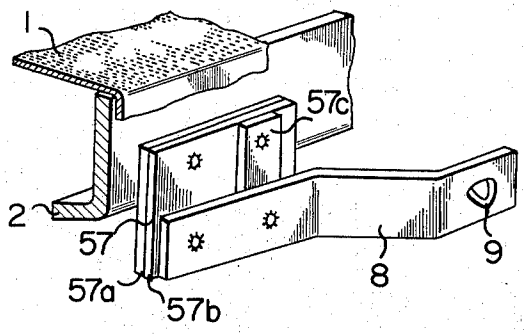


FIG. 3



SHADOW MASK SUPPORT STRUCTURE INCLUDING A PLURALITY OF BIMETALLIC ELEMENTS FOR EACH LEAF SPRING

This is a division of application Ser. No. 19,945 filed Mar. 16, 1970, now U.S. Pat. No. 3,660,708 issued May 2, 1972.

The present invention relates to a mechanism for supporting the shadow mask of a color television picture tube at three or four places in its frame on a face panel.

In a picture tube provided with a shadow mask, the shadow mask is normally supported resiliently on a face panel through mask supporters at three or four places on the mask frame itself. For said mask supporter, a metallic leaf spring is generally used. This spring is welded at one of its ends to the outer face of the frame side wall, the other end of said spring being engaged by a pin provided on the inner surface of the side wall of the face panel through a hole formed on said other end of the leaf spring.

However, in such a mask support mechanism, when thermal expansion occurs in the shadow mask during operation of the picture tube, the electron beam path is deviated with the result that the color purity characteristics of the picture tube are substantially degraded.

In order to overcome this disadvantage, it has hitherto been proposed to provide a bi-metal piece in a shadow mask supporter so that the shadow mask is slightly displaced toward the screen in accordance with the thermal expansion of the shadow mask.

However, in this arrangement, when the bi-metal piece is deflected, the spring is subjected to a local twist which undesirably prevents the shadow mask from being uniformly displaced throughout its surface.

Therefore, an object of the present invention is to reduce the amount of the twist which appears when the bi-metal is deflected.

It is a further object of the present invention to reduce the relative sliding movement between the spring and said pin at the points of engagement thereof.

It is a still further object of the present invention to arrange the shadow mask so that it can be displaced smoothly and uniformly throughout its surface along the axis of the tube when it is thermally expanded or contracted.

The present invention will now be described with reference to preferred embodiments shown by way of example in the accompanying drawings, in which;

FIGS. **1–3** show perspective views of various mask supporters, each of which may be used in a mask support mechanism made in accordance with the present invention.

The description of prior art devices and their relationship to the present invention discussed at length in our U.S. Pat. No. 3,660,708 is incorporated herein by reference.

The present invention will now be described in more detail with reference to the accompanying drawings.

One embodiment of the present invention is shown in FIG. **1.** In this embodiment, two bi-metal pieces **27** and **37** are employed in parallel for one mask supporter, the thermal deflection of the bi-metal piece **37** adjacent to the pin being determined to be smaller as compared with that of the other bi-metal piece **27.** This is done by determining the combination of the materials for the

lower thermal expansion metal layer **27***a* and the higher thermal expansion metal layer **27***b* to be different from that of the materials for the lower thermal expansion metal layer **37***a* and the higher thermal expansion metal layer **37***b* so that the deflections of the bi-metal pieces **27** and **37** are different from each other. Alternatively, the thickness or shapes of the layers may be varied to accomplish the same purpose. Further, the bi-metal piece **37** located at the side adjacent to the pin **10** may be replaced by a metal plate having a single layer.

In the embodiment of the present invention shown in FIG. **2,** a U-shaped metal plate **47***a* of a lower thermal expansion coefficient is combined with a metal plate **47***b* of a higher thermal expansion coefficient attached thereto at its leg remote from the pin, the other leg of the plate **47***a* being left as a single layer metal plate.

Further, in the embodiment shown in FIG. **3,** a substantially rectangular bi-metal piece **57** having a metal plate **57***a* of a lower thermal expansion coefficient and a second metal plate **57***b* of a higher thermal expansion coefficient is further combined with a small metal piece **57***c* welded to the outer side surface of the metal plate **57***b* at the side nearer to the pin so that the amount of deflection of the bi-metal is mechanically reduced at this side.

It is to be noted that a shadow mask mechanism should not necessarily be provided with the mask supporter of the present invention in all of the locations where mask supporters are used, but only one of the tube supporter of the present invention may be used at the upper side of the face panel and two or three mask supporters having conventional bi-metal arrangements may be used in the other places.

What is claimed is:

1. A shadow mask support mechanism for a color television picture tube including a plurality of mask supporters for supporting a shadow mask mounted on a frame adjacent a face panel; at least one of said mask supporters comprising deformable bimetallic means; said bimetallic means being disposed to displace said shadow mask in the direction of the television screen, said deformable bimetallic means having opposite end portions between which deformation occurs positioned in the direction of the length of said tube such that one end portion is secured to a wall of said shadow mask frame and the other end portion is secured to one end portion of a leaf spring, the longitudinal axis of said leaf spring extending substantially transversely of the axis extending between said opposite end portions of said bimetallic means, wherein the other end portion of said leaf spring engages a pin secured on the side wall of said face panel; said bimetallic means comprising first and second bimetallic members, said first bimetallic member, having a long axis which extends in the direction of the length of said tube, being disposed closer to said pin along the longitudinal axis of said spring then said second bimetallic member, the long axis of which extends substantially parallel to the axis of said first member, said first bimetallic member having a smaller relative thermal coefficient of expansion than said second bimetallic member, wherein said first bimetallic member, disposed closer to said pin along the longitudinal axis of said spring, deforms less than said second bimetallic member, and whereby twist imparted to said spring due to deformation of said bimetallic means is maintained substantially uniform along the length of said spring.

* * * * *