United States Patent

[11] 3,547,255

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[73] Assignee **General Electric Company**
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[54] **GETTER ASSEMBLY**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **206/0.4;** 313/174
[51] **Int. Cl.** **H01j 19/70**
[50] **Field of Search** 206/0.4; 313/174

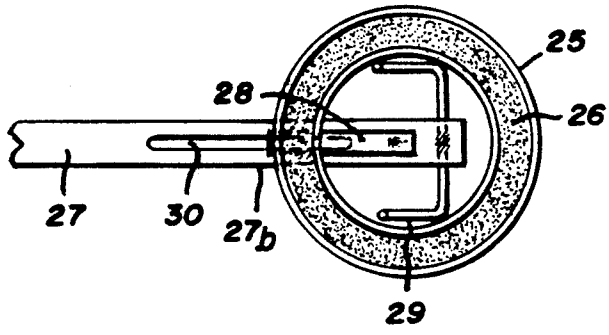
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3,390,758	7/1968	Reash et al.	206/0.4

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ABSTRACT: An improvement in a getter assembly of the type having a getter material container adapted to be cantilevered from an electron gun positioned in the neck portion of a glass electronic tube by a springlike, thermally conductive support strip or "antenna" to extend into the tube funnel portion adjacent to but spaced from the glass tube wall. The improvement comprises providing reinforcing means on the antenna strip adjacent its connection with the getter container to resist deformation of the strip when it is thermally softened by heat transferred to it from the container upon flashing of the getter material. Thus, direct contact between either the hot strip or getter container and the glass tube wall and consequent thermal cracking of the tube, which has heretofore often resulted from such deformation of conventional nonreinforced antenna strips, is eliminated or greatly reduced.



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FIG.1.

PRIOR ART

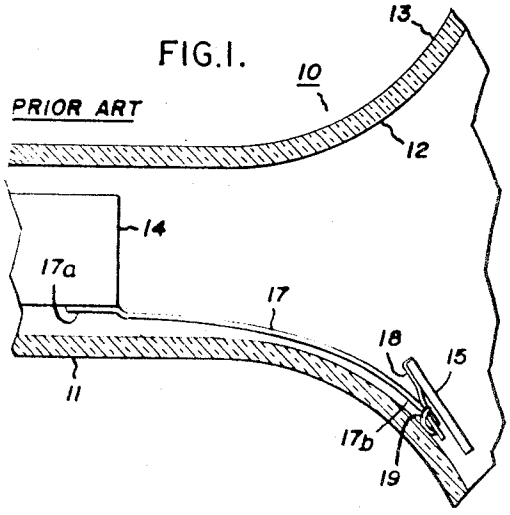


FIG.2.

PRIOR ART

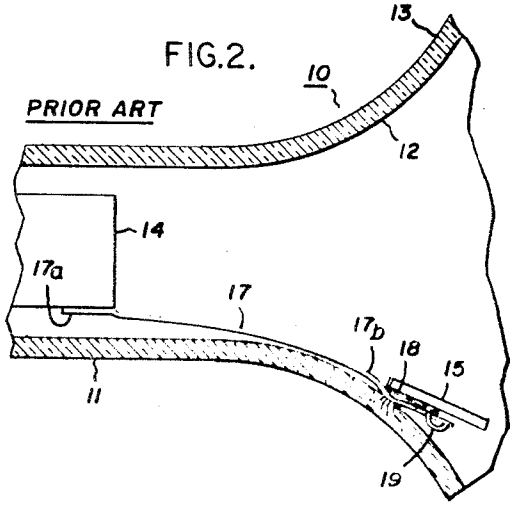


FIG.3.

PRIOR ART

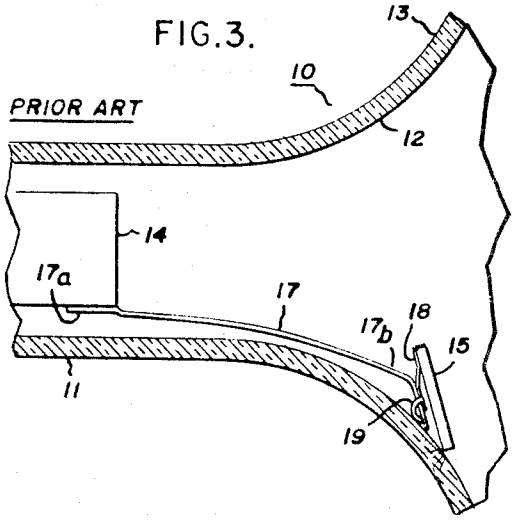


FIG.4.

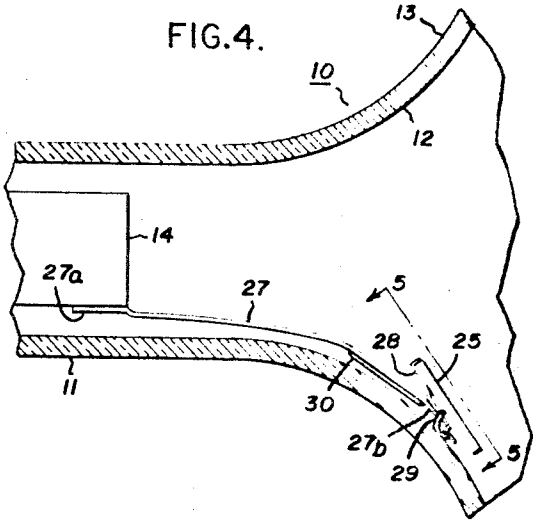
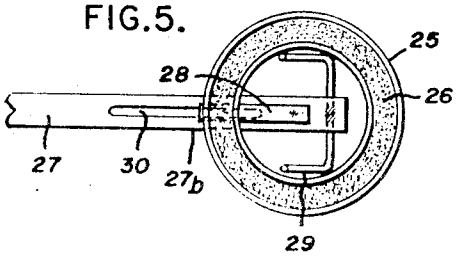


FIG.5.



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GETTER ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to an improved getter assembly and, more particularly, to an improved getter assembly of the type having its getter container adapted to be cantilevered from an electron gun mounted in the neck portion of a glass electronic tube by a springlike antenna strip to extend into the tube funnel portion adjacent to but spaced from the glass tube wall.

The use of the getter materials in the manufacture of electronic tubes is well known. A commonly used getter assembly comprises a container, such as an annular U-shaped receptacle, having the getter material pressed therein. This assembly is mounted in an electronic tube, for example, a television picture tube. After the tube is evacuated and sealed, the residual gases remaining in the tube are removed by heating the getter container and material therein to high temperature, as by induction heating, whereupon the active metal is yielded and deposits itself on the interior surfaces of the tube. This is known as "flashing" the getter. The getter material adsorbs or reacts with the residual gas molecules and removes them as low-vapor pressure solid condensates or compounds. This action continues throughout the life of the tube and removes any further gases liberated from the tube components.

Frequently, the getter material comprises a mixture or alloy of metals such as, for example, barium and aluminum. It is the barium component of this mixture which provides the reactive material. The cleanup of residual gases in the larger size television picture tubes, particularly color tubes, requires a fairly large amount of active barium material. A typical getter material mixture used in color television picture tubes may contain, for example, 850 mg. of a 25 percent barium—25 percent aluminum—50 percent nickel exothermic alloy, yielding about 200 mg. of barium on heating. The getter container itself may comprise a U-shaped channel formed into a ring of, for example, about 1 inch outside diameter and having a channel width of approximately 0.1 inch. The getter material mixture is compressed into the channel. The flashing of the getter material requires heating to a high temperature, approximately 1,300° C., **to vaporize the barium or whatever getter material is utilized. As a result of this heating, the residue and the container are themselves heated to a high temperature.**

The presence of this extremely hot getter container in a glass-walled electronic tube can cause serious problems. An electronic tube, particularly a television picture tube, generally comprises a neck portion in which is located the electron gun or guns; an enlarged bulb portion which terminates in a generally flat viewing screen; and a funnel-shaped portion joining the neck and bulb portions. Typically, the getter container or ring is cantilevered from the front of the electron gun by a springlike, thermally conductive support strip or antenna that generally conforms to but is slightly spaced from the inner walls of the tube funnel portion. Desirably, contact between the getter assembly and the tube funnel portion inner glass wall is restricted to so-called "point contact" via a small foot or feet attached to the base of the getter container. However, when the getter container is flashed to release the getter material, the heat is transferred from the getter container to the supporting antenna strip by conduction and radiation and, thus, causes the strip to soften. This thermal softening often causes a conventional antenna strip to deform either toward or away from the glass tube wall. Strip deformation toward the tube wall can result in direct contact between the hot strip and/or getter container and the glass wall. Strip deformation away from the tube wall can cause the getter container to pivot about its feet and thus result in direct contact between the hot getter container and the glass wall. In either event, heat cracks are caused in the glass and the tube becomes a reject. Since the tube is for the most part completely fabricated just prior to initial flashing of the getter material, the cracking of the tube at this time presents a substantial loss.

Heretofore, various means have been proposed to overcome this problem, a most recently popular one of which is described in U.S. Pat. No. 3,390,758 and involves providing a complex and, hence, rather expensive ceramic thermal insulator between the getter container base and the tube funnel portion glass wall.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an improvement in a getter assembly of the aforedescribed type wherein the getter material is cantilevered from an electron gun positioned in the neck of a glass electronic tube, such as a television tube, by a springlike, thermally conductive strip or antenna to extend into the tube funnel portion adjacent to but spaced from the glass tube wall. Basically, the improvement of the present invention comprises providing the antenna strip with reinforcing means adjacent its point of connection to the getter material container. The addition of the reinforcing means resists deformation of the strip when it is thermally softened by heat transferred to it from the getter container upon flashing of the getter material. Thus, the aforedescribed problem of thermal cracking of the tube, which has been presented by conventional getter assemblies employing unreinforced antenna strips, can be inexpensively greatly reduced or eliminated.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated in the accompanying drawings, wherein:

FIG. 1 is a fragmentary elevational cross-sectional view of the neck and funnel portions of a television picture tube employing a typical prior art getter assembly;

FIG. 2 is a view similar to FIG. 1 but showing the prior art antenna strip thermally deformed toward the tube wall and thus causing direct contact between the strip front end and the glass wall of the tube funnel portion;

FIG. 3 is a view similar to FIG. 1 but showing the prior art strip thermally deformed away from the tube wall and thus causing direct contact between the getter material container and the glass wall of the tube funnel portion;

FIG. 4 is a view similar to FIG. 1 but showing the tube equipped with a presently preferred form of the improved getter assembly of the present invention; and

FIG. 5 is a fragmentary sectional view taken along line 5–5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, and particularly to FIG. 1 thereof, there is shown a fragmentary sectional view of a typical glass electronic tube, a picture tube **10** for a television receiver. Such a tube may be viewed as having three main parts: a neck portion **11**, a funnel portion **12**, and a bulb or main tube portion **13**, only a part of which is shown. As illustrated, an electron gun **14** is positioned within the tube neck portion **11** with the gun long axis generally parallel to that of the tube neck portion.

The getter assembly shown in FIG. 1 is conventional and comprises an annular channel-shaped member or getter material container or ring **15** having the getter material compressed therein. The getter container **15** is cantilevered from the outer periphery of the front portion of the electron gun **14** by a thermally conductive, springlike antenna or support strip **17** to extend into the tube funnel portion **12** adjacent to but spaced from the tube glass wall. As illustrated in FIG. **1**, this conventional antenna strip **17**, which is preferably formed of steel, is substantially flat and rectangular in cross section and comprises an elongated strip having a first or rear end **17***a* which is connected by welding other suitable means to the gun **14**, and an opposite second or front end **17***b* which is extensible into the tube funnel portion **12** adjacent to but spaced from the glass tube wall. The second or front end of the antenna strip **17***b* is connected to a short metallic strip **18** which is,

in turn, connected to the base of the channellike getter material container **15**; the connections being made by welding or other suitable fastening means.

FIG. **1** shows the conventional prior art getter assembly in its originally installed or "ambient" condition. In this ambient condition, contact between the getter assembly and the wall of the tube funnel portion **12** is limited to that provided by point contact between a small metallic foot **19** that is connected by welding other suitable fastening means to the base of the getter container **15**.

Unfortunately, contact between the conventional getter assembly and the tube wall does not always remain so desirably restricted as shown in FIG. **1**, after the getter material is heated or flashed within the getter container **15**. At this time, the heat which is generated by the flashing of the getter material in the container **15** is transferred by conduction to the portion **17***b* of the antenna support strip which is immediately adjacent the point of connection to the container **15** via the short strip **18** and by direct radiation from the container base to the strip front end portion **17***b*. As shown in FIGS. **2** and **3**, the transfer of this heat may result in softening of the second or front end **17***b* of the antenna strip **17** and deformation thereof either toward (FIG. **2**) or away from (FIG. **3**) the glass wall of the tube funnel portion **12**.

As shown in FIG. **2**, deformation of the thermally softened conventional antenna strip front end **17***b* toward the glass tube can cause direct contact between the hot strip end **17***b* and the wall of the tube funnel portion **12**. As shown in FIG. **3**, deformation of the thermally softened conventional antenna strip front end **17***b* away from the tube wall can cause the getter material container **15** to pivot about its foot **19** and produce direct contact between the container **15** and the glass wall of the tube funnel portion **12**. In either event, the direct contact between the hot strip front end **17***b* (FIG. **2**) or the hot getter container **15** (FIG. **3**) and the tube funnel portion glass wall **12** will cause heat cracks in the glass wall and the tube **10** will become a reject.

In accordance with the present invention, it has been found that these aforedescribed problems of getter antenna strip deformation and consequent tube cracking can be inexpensively eliminated or greatly reduced by substituting an improved getter assembly, such as that illustrated in FIGS. **4** and **5**, for prior art getter assemblies such as that shown in FIGS. **1**—**3**.

As shown in FIGS. **4** and **5**, the improved getter assembly of the present invention is generally similar to the prior art assembly illustrated in FIG. **1** in that it comprises a generally ringlike channel member or container **25** which is adapted to contain getter material **26** compressed therein and a support strip or antenna **27**, formed of a springlike, thermally conductive material such as steel, which has a first or rear end **27***a* adapted to be connected by welding or other suitable fastening means to the electron gun **14** and an opposite second or front end **27***b* that is extensible into the tube funnel portion **12** adjacent to but spaced from the glass wall thereof. As illustrated in FIGS. **4** and **5**, the improved getter assembly of the present invention has its second or front end **27***b* connected to a short strip **28** which is in turn connected to the base of the getter container **25**; the connections being made by welding or other suitable fastening means. The getter container **25** of the improved assembly contacts the tube funnel portion wall **12** only through point contact via a small foot **29** which is also fastened by welding other suitable fastening means to the base of the getter container.

However, in accordance with the present invention, the improved getter assembly shown in FIGS. **4** and **5** avoids the previously described problems of thermal deformation that are present in the prior art getter assembly of FIGS. **1**—**3** by providing reinforcing means in the form of rib means **30** on the second or front end **27***b* of the improved antenna strip **27**. As illustrated in FIG. **4** and **5**, the rib means **30** comprises a single rib that is integrally formed with the antenna strip **27**, being compressed by a stamping operation into the upper surface of the strip second or front end **27***b* and generally aligned with the long axis of the antenna strip **27**. Typical dimensions of the improved antenna strip **27** comprise an overall length of 4 inches, with the rib **30** commencing at a point about ¼inch behind and extending about ⅜inch rearwardly from the foremost edge of the strip front or second end **27***b* and being 0.04 inches wide by 0.02 inches deep.

The addition of the reinforcing rib **30** provided by the present invention resists the deformation of front or second end **27***b* of the antenna strip **27** when it is thermally softened by the heat transferred to it from the getter container **25**, upon flashing of the getter material **26** whereby the aforedescribed problems of thermal cracking of the tube **10** are eliminated or greatly reduced.

As will be evident from the foregoing description, certain aspects of the present invention are not limited to the particular details of the form illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. For example, the rib means **30** might comprise more than one rib and might be separately formed and subsequently attached by suitable fastening means to the antenna strip front end **27***b* rather than integrally formed as illustrated. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the present invention.

I claim:

1. In a getter assembly of the type having a getter material container adapted to be cantilevered from an electron gun positioned in the neck portion of a glass electronic tube by a springlike, thermally conductive support strip having a first end connectable to the electron gun and a second end extensible into the tube funnel portion adjacent to but spaced from the tube funnel portion glass wall and connectable to the getter material container, an improvement comprising: reinforcing means provided on the strip adjacent its second end to resist deformation of the strip relative to the tube funnel portion glass wall upon thermal softening of the strip by heat transferred to it from the getter material container on flashing of the getter material, said reinforcing means being integrally formed with the strip.

2. In a getter assembly of the type having a getter material container adapted to be cantilevered from an electron gun positioned in the neck portion of a glass electronic tube by a springlike, thermally conductive support strip having a first end connectable to the electron gun and a second end extensible into the tube funnel portion adjacent to but spaced from the tube funnel portion glass wall and connectable to the getter material container, an improvement comprising: reinforcing means provided on the strip adjacent its second end to resist deformation of the strip relative to the tube funnel portion glass wall upon thermal softening of the strip by heat transferred to it from the getter material container on flashing of the getter material, said reinforcing means comprising rib means.

3. The invention of claim **2**, wherein said rib means is integrally formed with the strip.

4. The invention of claim **2**, wherein said rib means consists of a single rib.

5. The invention of claim **4**, wherein said single rib is integrally formed with the strip.