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Reash et al.

[11] **3,829,730**

[45] **Aug. 13, 1974**

[54] **GETTER ASSEMBLY**

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[52] **U.S. Cl.** **313/174,** 417/48

[51] **Int. Cl.** **H01j 19/20**

[58] **Field of Search** 313/174, 178; 417/48

[56] **References Cited**

UNITED STATES PATENTS

3,508,105 4/1970 Pappadis 313/178

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Attorney, Agent, or Firm—Frederick J. McCarthy, Jr.

[57] **ABSTRACT**

An improved getter assembly is provided for slideable insertion into a TV picture tube comprising a getter container, supported by an extended flexible spring-like support arm adapted to urge the getter assembly against the wall of the picture tube, the getter container having at least one side wall and a connecting floor member and a small cross section wire member depending downwardly from the floor member and having as a part thereof at least two laterally spaced apart curved base portions extending into said picture tube substantially parallel to the spring-like support member and for contacting the inner walls of the tube and supporting the getter container off the wall of the tube.

7 Claims, 8 Drawing Figures

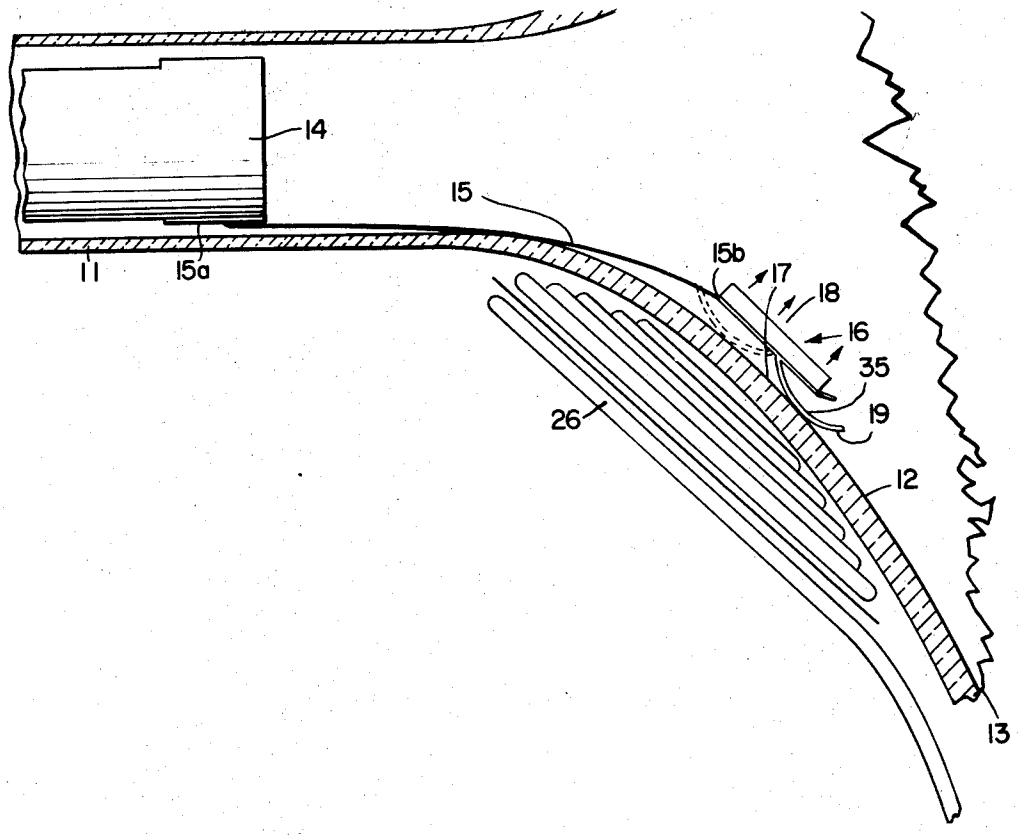


FIG. 1

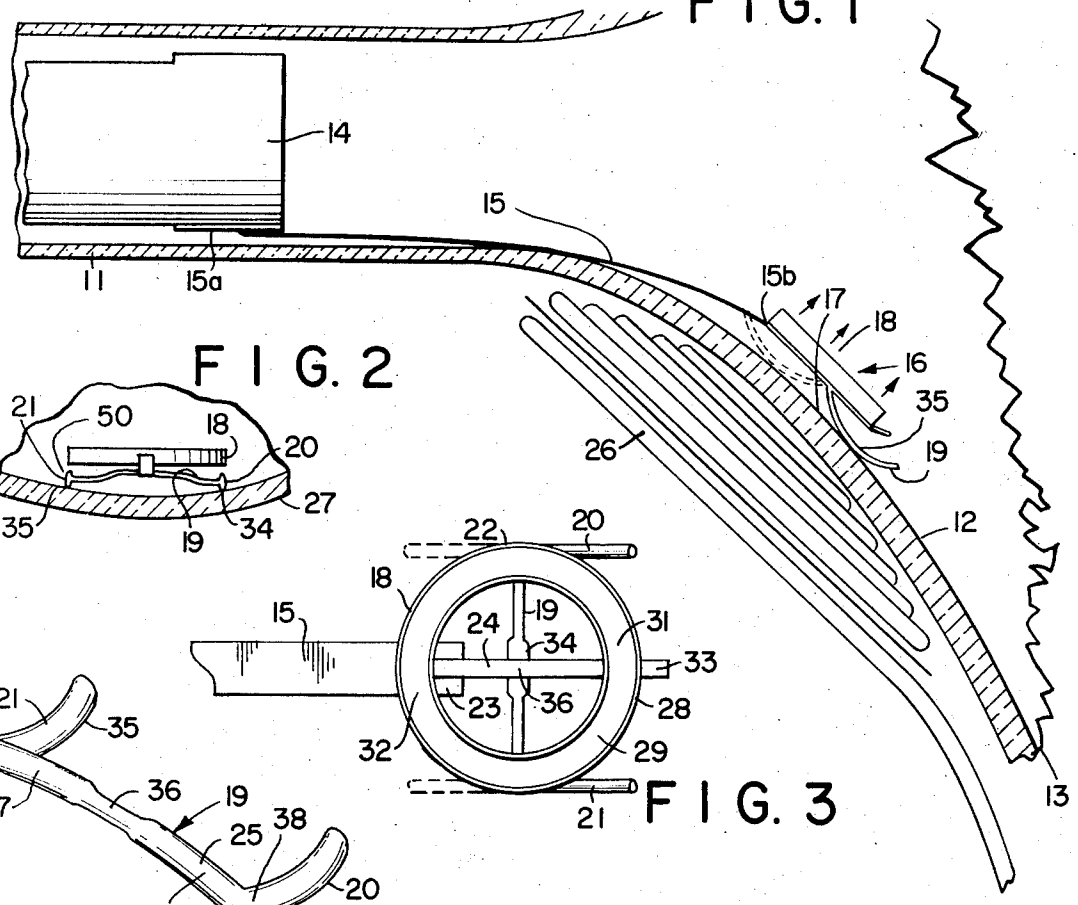
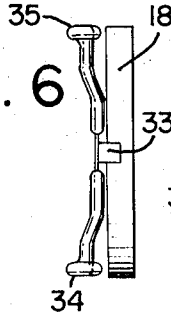


FIG. 2

FIG. 3

FIG. 4

FIG. 6



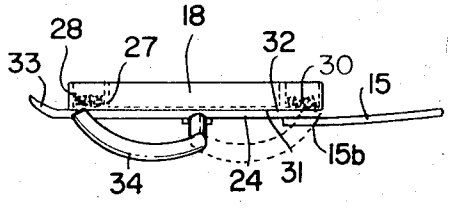


FIG. 5

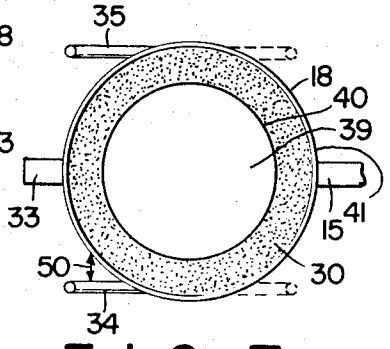


FIG. 7

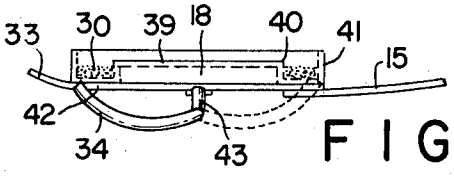


FIG. 8

GETTER ASSEMBLY

This invention relates to an improved getter assembly and more particularly to an improved channel ring getter assembly adapted for mounting in a television picture tube against a wall thereof without danger of damaging said wall during insertion of the device into the tube or during flashing of the getter material and without danger of entanglement with other adjacent getter assemblies.

The use of getter materials in the manufacture of electronic tubes is well known. A commonly used getter construction consists of a container, such as an annular U-shaped receptacle, with the getter material pressed into the container. This assembly is mounted in an electron tube, for example, a television picture tube. After the tube is evacuated, the residual gases left in the tube are removed by heating the getter container and material therein to a high temperature, suitably by induction heating, whereupon the getter material is flashed or vaporized. The vaporized getter material adsorbs or reacts with the residual gases and removes them as low vapor pressure solid condensates and continues to adsorb any further liberated gases throughout the life of the tube.

Usually the getter material principally 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 clean up of residual gases in the larger sized television picutre tubes, and particularly color tubes, requires a relatively large amount of active barium material. For example, color tubes having three electron guns and a metal shadow mask have been found to require a yield of about 200 to 250 mg. of barium. It has further been found desirable to employ exothermic gettering powders in color television picture tubes. An exothermic gettering powder can comprise: a barium-aluminum alloy or mixture plus about an equal weight of powdered nickel. The nickel reacts exothermically with the aluminum upon heating to supply additional heat for evaporating the barium.

A typical channel ring exothermic getter used in color television picture tubes thus may contain, for example, 1,000 mg. of a 25 per cent barium – 25 per cent aluminum – 50 per cent nickel exothermic alloy yielding about 200 to 250 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, say, 0.150 inch to 0.220. The getter powder is pressed into the channel width of, say, 0.150 to 0.220 inch. The getter powder is pressed into the channel. The flashing of the getter requires heating to a high temperature, about 1,300° C., to vaporize the barium, or whatever getter material is utilized. As a result of this heating, the residue and the channel ring container are themselves heated to a high temperature. This heating results in the melting or sintering of the residue barium-nickel-aluminum powder, or whatever unflashed material is present. The container itself, generally stainless steel, is itself heated to a temperature often near its melting point; and in the case of improperly formed or positioned getter assemblies, the stainless steel ring may melt.

The presence of this extremely hot getter container in a glass-walled electron tube can cause serious problems as will be seen from the following: an electron tube, particularly a television picture tube generally comprises a neck portion in which are located the electron gun or guns and auxiliary equipment; an enlarged bulb portion which terminates in a generally flat viewing screen; and a funnel-shaped portion joining the neck and bulb portions. Whereas in the past, the ring-shaped getter container was usually mounted in the neck portion of the tube positioned on the electron gun, it is now a desired practice to mount the getter container in or near the funnel portion of the tube. Since the getter container must be outside the path of the stream of electrons directed from the electron gun toward the screen, and since the diameter of the funnel cross section at the selected site maybe only slightly larger than that of the neck portion, it is necessary to have the getter container actually abutting against the wall of the tube. This is accomplished by mounting the getter container at the end of a spring-like metallic strip support or "antenna," the other end of which is fixed to a wall of the electron gun in the neck portion of the tube. The spring is biased to force the getter container against the wall of the tube in the funnel portion and thus keep clear the path for the electron beam and to hold the getter on the funnel wall to promote good coupling with the R-F induction heating coil.

This positioning of the getter container in direct contact with the glass walls of the tube can and often does cause cracking of the glass when the getter container is heated inductively to high temperatures during flashing. Since the television tube is for the most part completely fabricated just prior to gettering, the cracking of the tube at this time is a substantial loss. In addition, it is important that the getter container be properly aligned inside the tube so that it is properly heated by the coil and so that the gettering flash is properly directed. Such alignment is difficult to achieve using normal production line techniques. In an attempt to overcome the problem of the tube cracking due to localized heating from contact with the extremely hot base of the getter container, a ceramic member or other insulating member was positioned between the getter container and the tube wall. The ceramic heat shield is held to the underside of the getter container by one or more metallic wires, tabs or bars. It has been found, however, that the ceramic member is subject to physical abuse during shipment and installation of the getter in the tube (or during removal of the TV gun from a tube which must be reworked) and may crack or chip loosening the ceramic member in its support. The presence of an unsecured member such as this is undesirable because the resulting rattle can be confused by tube assemblers as being an indication of the breakage of a major electronic component of the tube and result in the need to reopen the tube for inspection. Additionally, the presence of any loose foreign bodies, such as the chips from a ceramic member, is highly undesirable in a TV tube because of possible interference with the delicate electronic components therein.

It has also been known to support the getter container by means of a curved wire support members which curve back in the direction of the picture tube neck as disclosed in U.S. Pat. No. 3,508,105. Such an arrangement minimizes cracking of the tube envelope due to localized heating, but becomes readily entangled with adjacent getter assemblies arranged for production line insertion in picture tubes resulting in damaged

electron guns and/or deformed and distorted antenna getter assemblies which will not flash properly, resulting in inadequately gettered tubes.

It is the primary object of this invention, therefore, to provide an improved getter assembly which will not cause cracking of the tube wall during getter flashing, which does not employ breakable insulating members and which prevents entanglement with adjacent getter assemblies.

Other aims and advantages of this invention will be apparent from the following description, the appended claims and the attached drawings.

According to the present invention, an improved getter assembly is provided for mounting in an electron tube in an abutting relationship to a wall of the tube, said assembly comprising a getter container having at least one continuous side wall and a floor member connecting said side wall and having getter material pressed into the space formed by said side wall and the floor member, and a small cross section wire support member depending downwardly from the floor member and having as a part thereof at least two laterally spaced apart base portions for contacting the walls of a tube and supporting the getter container off the tube wall in a non-heat damaging relationship therewith, said base portions being curved inwardly into the pciture tube to provide minimal area of contact with the tube wall, ease of slideable movement along the tube walls during insertion into or removal of the getter assembly from the tube, and to avoid entanglement with adjacent getter assemblies. The curved base portions act as skids having low frictional resistance with the tube walls whereby the getter container can be easily inserted into the tube or removed therefrom.

The getter container can be an annular channel ring getter container having opposing inner and outer circular side walls and an annular floor member connecting said side walls to form an annular space into which the getter material is pressed. The channel container could also be formed in other than circular configurations, e.g., in an oval shape. The getter container could also be a dish-shaped container having, e.g., a circular floor member with an upstanding continuous side wall encircling the floor member.

In one embodiment of the invention, the small cross section wire support member is connected near its mid portion to the underside of the getter container and the end portions of the wire support members are each bent in a plane perpendicular to the mid section of the wire support member, first downwardly and then upwardly to form curved base portion for abutting against the walls of the tube. The curved base portions should each lie in planes which are parallel to the direction of insertion into the tube so as to allow for minimal contact with the walls of the tube during insertion and the ends of the curved portions should extend in the direction of insertion.

In another embodiment of the invention, a channel ring container has a mounting bar extending across a diameter thereof and fastened at opposite sides of the container floor member. The mounting bar extends in the same direction as the device is inserted into the tube. The small cross section wire support member has a central portion arranged generally perpendicular to the mounting bar and is connected at its mid point to the mounting bar, with the opposite end portions of the wire support member each bent in a direction perpendicular to the central portion of the wire support member, parallel to the mounting bar, first downwardly and then upwardly in the direction of insertion into the picture tube to form curved base portions for abutting against the walls of the tube.

In the drawings:

FIG. **1** is a partial schematic view of the neck and funnel portions of a television picture tube, in cross section, including a getter assembly of the present invention, mounted in an "antenna" position;

FIG. **2** is a partial view of the arrangement of FIG. **1** looking from the neck into the funnel of the tube;

FIG. **3** is a plan view of the portion of a picture tube and getter assembly of FIG. **1**;

FIG. **4** is a perspective view of the wire member which is mounted under the getter container for supporting the getter container off the walls of the tube;

FIG. **5** is a side view of the getter assembly;

FIG. **6** is an end view of the getter assembly;

FIG. **7** is a plan view of another embodiment of the getter assembly of this invention; and

FIG. **8** is a side view of the embodiment shown in FIG. **7**.

Referring now to FIG. **1**, a portion **10** of a typical glass television tube is shown. Such a tube may be viewed as having three main parts, a neck portion **11**, a funnel portion **12**, and the bulb or main portion, only a part **13** of which is shown. An electron gun **14** is shown positioned in the neck of the tube. A flat antenna spring or support arm **15** is shown fixed at one end **15***a* to the side wall of the gun and having mounted on its opposite end **15***b* the getter assembly **16** of this invention. The support arm **15** is a piece of flat thin, flexible generally non-magnetic, metal strip biased to urge the getter assembly **16** against the wall **17** of the tube, in the case shown, in the funnel portion **12** of the tube. It is to be understood that the getter assembly of this invention could be used in other portions of the tube, if desired, with other arrangements for biasing it against a wall of the tube.

The getter assembly **16** comprises a getter container **18** and underlying wire support member **19**. As seen in FIGS. **1** and **2**, the curved end portions **20** and **21** of the wire support member **19** are the only parts of the getter assembly **16** which actually contact the glass wall **17** of the tube and these parts extend parallel to support arm **15** on the direction of insertion into the picture tube. In FIG. **2**, which is a view in a direction parallel to the axis of the electron gun, the wire member support is seen to touch the tube wall at its two outer extremities **20** and **21**, which are widely spaced apart and result in a stable positioning of the getter assembly and assuring proper orientation of the getter container in the tube, and assuring a properly directed flashing of the vaporized getter material into the tube interior as shown by the arrows.

A particular advantage of the getter assembly of the present invention derives from the arrangement of the portions indicated at **20** and **21** in the drawing whereby these portions extend parallel to support arm **15** and in the direction of insertion of the getter assembly. In the past, it has been a common practice to arrange such portions as shown in dotted lines in FIGS. **1**, **3**, and **4** since it is conventional to slide the sled or skid runner ends so that they extend away from the direction of sliding. However, in commercial assembly practices, getters are stocked together and, with skids in the form

shown in the dotted lines often became entangled. Also, when such getter assemblies were attached to electron guns **14** and arranged adjacently in trays, prior to insertion in picture tubes following conventional assembly procedures, the antenna supports **15** of one getter assembly often became entangled with the skids of another getter assembly. Assembly personnel, in attempting to free the getter assemblies would often permanently deform the entangled antenna member, effectively resulting in their destruction. At other times, the deformed assemblies would be inserted in picture tubes and result in poor flashing, i.e., deficient gettering, due to misalignment of the getter assemblies, resulting in the loss of an entire picture tube assembly. With the arrangement of portions **20** and **21** in accordance with the present invention, this problem has been virtually eliminated.

FIG. **3** shows a plan view of a particular embodiment of the invention, a channel ring type getter container **22.** The wire support member **19** is visible in the open center of the ring container. The end **23** of the antenna support arm **15** is shown fixed to a mounting bar **24** which is a part of this embodiment of the getter assembly, as hereinafter set forth.

FIG. **4** shows a perspective view of the wire support member and FIGS. **5** and **6** show a side view and an end view of the getter assembly. As shown, the wire support member **19** is made from a section of wire **25** having a small diameter and resulting small cross section and low mass. When the getter assembly **16** is heated by the R-F induction heating coil **26** to flash the getter material, the small diameter wire support member **19** will not be heated to a high temperature because of its low mass. Additionally, since the curved end portions **20** and **21** are the only portions of the getter assembly which contact the glass walls of the tube and since the area of contact is minimal because of the curve of these portions, the glass wall is not subjected to the high temperatures which may exist during flashing in the getter container **18.**

More specifically, in the embodiment shown in FIG. **3,** the getter container **18** is seen to be composed of a channel member having opposing side walls **27** and **28** and annular bottom wall **29** connecting the side walls. The getter material **30** may be pressed into the space formed by the side walls and the bottom wall. The channel member has its ends joined to form a conventional ring shape, although it is to be understood that getter containers of other than ring shape may be employed, e.g., oval shapes.

The channel ring getter container has a mounting bar **24** extending across a diameter of the ring and secured at the underside of the floor member **29** at points on opposite sides **31** and **32** thereof, as by spot welding. The mounting bar **24** has an end portion **33** which extends past the edge of the getter container and which is bent upwardly. The free end **15***b* of the antenna support arm **15** is fixed to the underside of the mounting bar at the end of the mounting bar opposite the upwardly bent portion **33,** as by a spot weld in the vicinity of previously welded site **32** so that the mounting bar and support arm are coaxial. The getter assembly is inserted into the tube with the mounting bar and antenna arm parallel to the central axis of the tube.

The wire support member **19** consists of a length of small diameter wire having a middle portion **25** preferably about equal to or less than the length of a diameter of the channel ring, and having its end portions **20** and **21** both bent in a direction perpendicular to the middle portion **25.** These end portions are both bent first downwardly and then upwardly to form curved bases **34** and **35.** The wire support member **19** is arranged perpendicularly to the mounting bar **24** and fastened at its mid-point **36,** which can be flattened, to about the mid-point of the mounting bar **24,** as by a spot weld. At times it may be of advantage to fasten the wire support member **19** away from the center of the mounting bar **24.** The wire support member will thus depend downwardly from the getter container with the curved bases **34** and **35** situated under opposite edges of the ring container. The bases **34** and **35** are the only portions of the getter assembly which come in contact with the walls of the tube. Since there is no direct contact between these bases **34** and **35** and the getter container, there will be little transfer of heat from the getter container to the bases and the glass walls of tube thereunder. Additionally, since the wire support member is formed from a small diameter wire and has a low mass, this member will not itself be highly heated by the R-F getter flashing coil. Since the device is inserted into the tube in a direction parallel to the axis of the mounting bar, the curved bases **34** and **35** will act as skids whereby the getter assembly slides along the walls of the tube into its proper position.

The wire support member may be joined directly to the getter container instead of being joined to the base of the mounting bar **24.** For example, the ends **37** and **38** of the wire support member may be joined to opposite points of the underside of the channel ring floor member **29,** as by spot welding. The wire support member could also be joined to the underside of a solid center getter container of the type shown in FIG. **7** which has a solid center piece **39** of the periphery of which also forms the inner wall **40** of the channel ring. The outer wall **41** forms with this inner wall **40** the annular space into which the getter material is pressed. In the embodiment shown in FIGS. **7** and **8,** a mounting bar **42** is attached at opposite sides of the bottom of the channel floor member and the wire support member **43** is connected to this mounting bar. The wire support member **43** need not be joined by means of such a mounting bar but could be joined directly to the underside of the center piece **39** by having the midpoint of the wire support member extend upwards to meet the center piece **39** and then welding it there. An advantage of a solid center getter container as shown in FIGS. **7** and **8** is that the solid center piece **39** is heated during flashing of the getter container. Any getter material which is deposited on this hot center piece during flashing is immediately revaporized and directed into the bulb of the tube. With reference to FIG. **7,** in a preferred embodiment of the present invention, the space **50** between the getter container **18** and base members **34** and **35** are arranged to be less than the thickness of the base members so that entanglement of the base members of adjacent getter assemblies is avoided.

Other types of getter containers having solid centers, e.g., a dish-shaped getter container having a substantially flat circular bottom member may have the wire support member of this invention attached to the bottom thereof either directly or by means of a mounting bar.

It has been found that the wire support member of this invention having curved inwardly, end portions al-

lows for the accurate positioning of the getter container in the tube relative to the positioning of the heating coil and eliminates the problem of entanglement as above mentioned. These are important industrial considerations. The wire support member ensures proper positioning of the getter container so that identical flashing conditions are obtained from tube to tube. While the wire support member is shown with two spaced apart end portions **34** and **35,** it can also be furnished with additional curved end portions to achieve, e.g., a three-point support of the container off the wall of the tube, so as to orient the getter container at a specific angle in the tube to cause flashing of barium in a specified direction. The support member in such a case would have an additional wire leg connecting the third end portion to the center of the support member. It is only necessary that each curved portion be bent in the direction in which the getter container is to be inserted into the tube, so that the getter container could be slid into the tube using the curved end portions as runners having slight frictional resistance on the walls of the tube.

It has been found that getter containers having the wire support members of this invention do not cause excessive heating of the tube wall during flashing. Because of the low mass of the support member, it is not heated to a high temperature and because of the small area of contact between the curved end portions and the tube wall, there is little transfer of heat from the support member to the tube wall. As a result the problem of glass cracking is substantially eliminated. Additionally, because the inwardly extending curved end portions of the wire support member act as skids of low frictional resistance, the getter container can be easily inserted without danger of entanglement into its proper position in the tube without excessive scraping of the aquadag coating normally present on the walls of such tubes. The getter container can just as easily be removed from the tube should the need arise.

What is claimed is:

1. An improved getter assembly adapted for insertion in an electron picture tube in an abutting relationship to a wall of the picture tube, said assembly comprising a getter container having at least one side wall and a floor member connected to said side wall and having getter material pressed into the space formed by said side wall and floor member, an extended springlike support arm attached to the getter container adapted to urge the getter container toward the wall of the picture tube upon insertion of the getter container therein and a small circular cross section wire support member depending downwardly from the floor member of said getter container having as a part thereof at least two laterally spaced apart and substantially base portions parallel for contacting the walls of the picture tube and supporting the getter container in a substantially non-heating relationship therewith, said base portions being substantially parallel to said springlike support arm and being curved in the direction of insertion into the picture tube to provide minimal areas of contact with the tube wall for ease of slideable movement along the tube walls during insertion into or removal of the getter assembly from the tube and for the elimination of entanglement with other getter assemblies.

2. The getter assembly of claim **1** in which the getter container has opposing inner and outer circular side walls and an annular floor member connecting said side walls to form an annular space into which the getter material is pressed.

3. The getter assembly of claim **2** which additionally comprises a mounting bar extending across the bottom of the getter container and joined at opposite points on the underside of the floor member, with the wire support member arranged transversely of the mounting bar and joined at its mid-point to the mounting bar, the two end portions of the wire support member being each bent in a plane parallel to the mounting bar, first in a downward direction and then in an upwards direction to form curved bases for supporting the getter container off the wall of the electron tube.

4. The getter assembly of claim **3** in which the end of the mounting bar opposite the curved ends of the wire support member extends beyond the edge of the getter container and is bent upwardly.

5. The getter assembly of claim **3** which the wire support is a wire of generally circular cross section flattened at its mid-point for attachment to the mounting bar.

6. The getter assembly of claim **3** which the mounting bar is a metallic strip having a flat undersurface for attachment of the wire support member and for attachment of an antenna support arm.

7. The getter assembly of claim **2** in which the getter container has a solid center piece having a depending skirt portion around its periphery which forms the inner circular wall of the annular space for holding the getter material.

* * * * *

Dedication

3,829,730.—*Clair W. Reash*, Fairview Park, and *Vincent Pietrasz*, Cleveland, Ohio. GETTER ASSEMBLY. Patent dated Aug. 13, 1974. Dedication filed June 29, 1977, by the assignee, *Union Carbide Corporation.*

Hereby dedicates to the Public the remaining term of said patent.

[*Official Gazette August 23, 1977.*]