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Lebel

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[54] **METHOD OF MANUFACTURE FOR CATHODE-RAY TUBES FOR COLOR TELEVISION RECEIVERS**

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[52] **U.S. Cl.** **65/59,** 29/472.9, 65/43, 161/195

[51] **Int. Cl.** **C03c 27/02**

[58] **Field of Search** 65/59, 43, 58; 161/196; 29/472.9; 313/83

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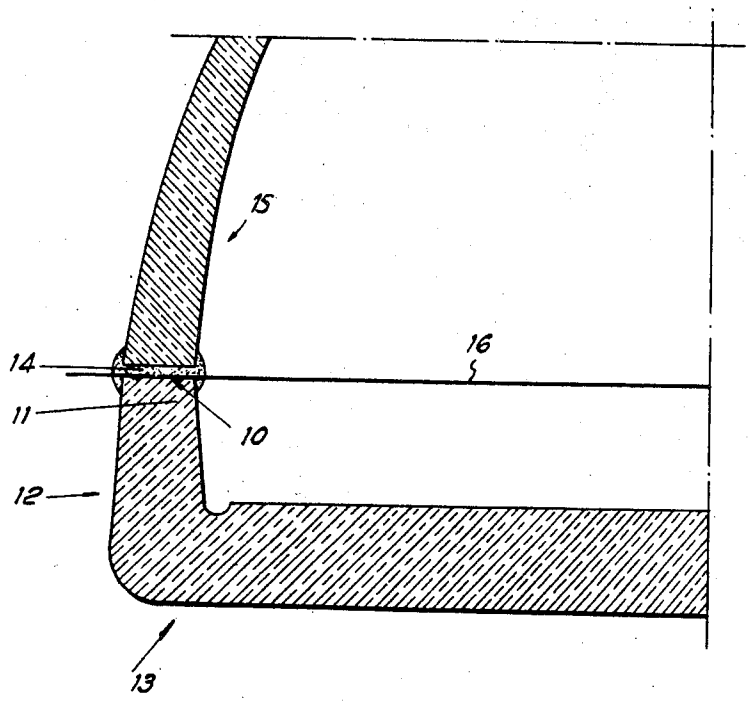
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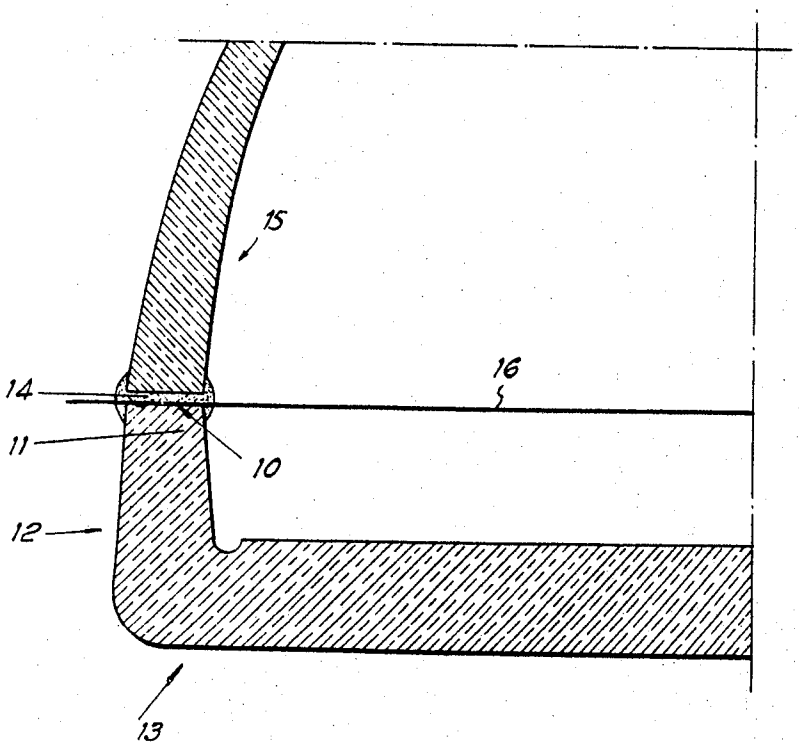
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[57] **ABSTRACT**

A method of manufacture for cathode-ray tubes for color television receivers of the type in which a grid consisting of parallel metal wires is disposed in the tube facing the front wall on which the television image is formed. The wires of the grid are of a non-magnetic alloy with a high cobalt content, as a rule more than 20 percent by weight, the composition further being such that in the course of heat treatment for joining the front portion of the tube with the conical portion by means of a sealing compound, oxides favorable to the airtight connection between the alloy and the sealing compound appear at the surface of the wires which renders unnecessary a second step of heat treatment for forming a sealing fillet at the outer ends of the wires.

4 Claims, 1 Drawing Figure




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METHOD OF MANUFACTURE FOR CATHODE-RAY TUBES FOR COLOR TELEVISION RECEIVERS

This application is a division of application Ser. No. 35,831, filed May 8, 1970 and now abandoned.

FIELD OF THE INVENTION

The invention concerns the manufacture of picture tubes for color television receivers, particularly such tubes in which a grid comprising parallel metal wires is disposed in the tube facing the front wall or screen on which is formed the image.

More particularly, the invention concerns the manufacture of tubes according to which each wire of the grid is held by the joining of the front portion of the tube, or forward face comprising the screen, to the middle-rear or conical portion of the tube.

PRIOR ART

In the manufacture of color picture tubes, the front portion is joined to the middle-rear portion by means of a glass-base cement in which the ends of the wires, previously positioned between the two portions of the tube, are embedded which thus simultaneously assures the securing of both the wires and the portions of the tube.

In the manufacture of such tubes at present, it has been found that the joint thus obtained is not airtight and a second manufacturing step is necessary according to which the joint between the two portions is protected by additional filler material which is usually also cement such as that which is interposed between the edges of the two portions of the tube and forms a outer fillet which straddles the joint.

The second step of manufacture is indispensable for assuring the airtightness; further, this step significantly increases the cost of the tube and causes additional mechanical stresses in the tube owing to the heat treatment of the second step and therefore increases the risk of rupture or cracking the tube which may also lead to the tube being discarded.

SUMMARY OF THE INVENTION

My invention consists in a method for use in the manufacture of color picture tubes with grids for joining the front portion of the tube to the middle-rear portion by heat treatment and with the aid of a sealing composition wherein the grid comprises wires formed of a non-magnetic alloy having a high cobalt content, and the composition of the alloy being such that during the course of the heat treatment oxides favorable to the formation of an airtight alloy-sealing composition joint are produced on the surface of the wires which render unnecessary a second heat treatment step for forming an airtight fillet about the outer ends of the wires.

It is an object of my invention to provide a method of manufacturing such tubes which enables a reduction in the cost of such tubes and an improvement in the operation thereof.

Metal alloys which can be bonded to glass by heating are known and the appearance of metal oxides during the course of heat treatment which is favored by the high content of cobalt in the alloy has been reported. It has not been possible however to form the wires of the grid of a color television picture tube of such an

alloy since such alloys are magnetic and would affect the paths of the electron beams.

Other alloys having a high cobalt content are also known, but such alloys have a coefficient of expansion very much different than that of glass, so that until now it has not been proposed to use them in forming metal-glass joints.

It has now been found in an unexpected manner that certain non-magnetic alloys having a high cobalt content can be used for the wires of a color television picture tube grid and that the forming of a joint between the forward portion and the middle-rear portion of the tube according to the usual method with the interposition of the wires there between enables the formation of an airtight joint along the wires which renders unnecessary the second step in the manufacture, i.e., forming a fillet which until now has been unavoidable.

It is thought that this result arises from the small sections of alloy formed as the fine wires of the grid of a picture television tube.

The invention contemplates to make the wires constituting the grid of an alloy having a high cobalt content, such as used in the manufacture of certain watch springs, which display excellent mechanical properties.

A grid is thus provided which is extremely well joined to a tube which is free of stresses which might cause cracking.

Moreover, the difference between the coefficients of expansion is profitably used to obtain in the course of cooling an additional tensioning of the wires of the grid which inhibits microphonic effects of the grid.

The alloys suitable for use according to my invention have a high cobalt content, as a rule greater than 20 percent, and usually also contain chromium, and molybdenum or tungsten.

Such alloys generally correspond to the following formula:

carbon	approx. 0.1%
silicon	approx. 0.3%
manganese	approx. 1.5%
nickel	10 - 30%
chromium	10 - 30%
molybdenum or tungsten	2 - 15%
cobalt	25 - 45%
iron	approx. 16%

Other features and advantages of the invention will become apparent from the description which follows.

BRIEF DESCRIPTION OF THE DRAWING

The sole accompanying FIGURE shows a section of a color television picture tube in the vicinity of the zone connecting the forward portion to the conical portion for explaining the method according to my invention.

DESCRIPTION OF A PREFERRED EMBODIMENT

The forward portion **12** of a color television picture tube formed of customary mild glass comprises a screen **13** and a flanged portion **11** having an edge **10.** Along the edge **13** is spread a layer **14** of a sealing or bonding mixture of the type which is currently used in such a method and which is a suspension of powdered glass in a base having a low viscosity (nitro-cellulose in

amyle acetate) as is known in the art under the name "Pyroceram."

A network of parallel prestressed wires **16** having a diameter in the order of 5/100 mm is interposed between the conical portion and the forward portion **12** and has the following composition by weight:

carbon	0.1%
silicon	0.3%
manganese	1.5%
nickel	16%
chromium	20%
molybdenum	6%
cobalt	40%
iron	16.1%

This alloy, known under the name "Phynox," is currently used in the manufacture of certain watch springs.

The combination is subjected to the usual heat treatment, i.e., starting from ambiant conditions, raising the temperature to 440°C in one and one half hours, maintaining this temperature for one hour, then returning the temperature to the ambiant temperature in approximately two hours.

At temperatures higher than 440°C, the glass of the soldering material is transformed into a partial crystalline structure which results in a bonding of devitrified glass.

During the lowering of the temperature, the wires are additionally tensioned owing to the coefficient of expansion of the alloy of which the wires are formed said coefficient being greater than that of the glass without however effecting the quality of the bonding apparently because of the high modulus of elasticity of the alloy which is used.

It has been found that the joint thus effected is absolutely airtight, in particular, there is no leak along the lengths of any of the wires.

It thus becomes unnecessary to recover the joint on its exterior with a fillet of the same material which is used as the sealing compound and to carry out another heat treatment.

The risk of rupture or cracking of the tubes thus produced is much less than that of known types of tubes with grids.

The tubes resisted without difficulty variations in temperature in spite of the fact that the coefficient of expansion of the alloy used is 135×10^{-7} quite larger than that of the sealing composition in which the wires were embedded which is from 89×10^{-7} to 94×10^{-7}.

The high modulus of elasticity of the alloy as well as the high yield point enables it to withstand higher tensions than the wires that are presently in use whose modulus of elasticity and yield point are lower.

What I claim is:

1. In a method of manufacture by heat treatment of a color television picture tube of the type including a front portion and a conical middle-rear portion formed of mild glass and assembled by use of a glass bonding compound with a grid interposed between the portions, the steps of forming the grid from wires of a substantially non-magnetic alloy having a cobalt content of at least 20 percent by weight to a diameter of approximately .05mm. and positioning said grid so that the ends of the wires extend outwardly of said bonding compound, whereby, owing to the composition of the alloy, oxides are formed on the surface of the wires as a result of said heat treatment, which enables the formation of an airtight bond between the wires and said bonding compound, wherein said wires are placed in tension.

2. A method in accordance with claim **1,** wherein the alloy contains at least 20 percent cobalt by weight, at least 10 percent chromium by weight, and at least 2 percent of a metal chosen from the group consisting of molybdenum and tungsten.

3. A method in accordance with claim **2,** wherein the composition of the alloy corresponds to the following formula by weight:

Carbon	Approx. 0.1%
Silicon	Approx. 0.3%
Manganese	Approx. 1.5%
Nickel	10–30%
Chromium	10–30%
A metal chosen from the group consisting of molybdenum and tungsten	2–15%
Cobalt	25–45%
Iron	Approx. 16%

4. A method according to claim **3,** wherein the wires are formed of an alloy having the following composition by weight:

Carbon	Approx. .1%
Silicon	Approx. .3%
Manganese	Approx. 1.5%
Nickel	16%
Chromium	20%
Molybdenum	6%
Cobalt	40%
Iron	16.1%

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