

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: 01.04.81

(51) Int. Cl.³: H 01 J 29/94, H 01 J 29/92

(21) Application number: 78200304.0

(22) Date of filing: 14.11.78

(54) Colour television display tube.

(30) Priority: 18.11.77 NL 7712707

**(43) Date of publication of application:
30.05.79 Bulletin 79/11**

**(45) Publication of the grant of the European patent:
01.04.81 Bulletin 81/13**

**(84) Designated Contracting States:
BE DE FR GB NL**

(56) References cited:
BE - A - 850 728
DE - A - 2 551 327
DE - A - 2 641 884
FR - A - 2 373 147
GB - A - 1 372 823
US - A - 3 796 903
US - A - 3 979 633

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Colour television display tube

The invention relates to a colour television display tube.

Generally a display tube comprises an envelope having a neck, a cone and a window portion, an electrode system which is provided in the neck for generating at least two electron beams, a display screen provided internally on the window portion, a colour selection electrode situated at a short distance from the display screen, an electric resistive layer provided on an internal wall portion of the envelope situated between the electrode system and the display screen, a high voltage contact provided in the envelope between the electrode system and the display screen and being connected electrically with the resistive layer, a getter which is attached to the high voltage contact by means of a resilient metal strip, and a magnetic screening cone extending within the cone including a low-resistance connection to the colour selection electrode and the resistive layer.

Such a display tube is disclosed in BE - A - 850 728. The resistive layer serves to restrict the detrimental results of a possible electric flash-over in the tube on the electronic circuit of the television receiver in which the tube is mounted. Said flash-overs occur mainly between adjacent electrodes of the electrode system situated in the tube neck which are operated at very different potentials. The capacitor formed by the conductive inner and outer coatings of the cone and serving as a smoothing capacitor for the high voltage of the tube discharges. The internal resistive layer restricts the current strength occurring in such a discharge as well as the speed at which said current strength reaches its maximum value. The possibility that damage is done to the electronic circuit of the receiver via inductive or capacitive couplings is thus reduced.

As disclosed in BE - A - 850 728 such a resistive layer presents problems which are related to the fact that an operating television receiver may be a source of interference for a radio receiver placed in the proximity thereof and tuned to a transmitter in the long or medium waveband. Said interference originates for a considerable part from the video signal. In order to reduce the interference caused by the video signal it is known from BE - A - 850 728 to provide a low resistance connection between the colour selection electrode and the resistive layer.

It is the object of the invention to provide a colour television display tube having an internal resistive layer in which simple measures are taken to provide the above-mentioned low resistance connection.

For that purpose, according to the invention, a colour television display tube comprising an envelope having a neck, a cone and a window

portion, an electrode system provided in the neck to generate at least two electron beams, a display screen provided internally on the window portion, a colour selection electrode which is situated at a short distance from the display screen, an electric resistive layer provided on an internal wall part of the envelope situated between the electrode system and the display screen, a high voltage contact provided in the envelope between the electrode system and the display screen and being connected electrically with the resistive layer, a getter which is attached to the high voltage contact by means of a resilient metal strip, and a magnetic screening cone extending within the cone and including a low-resistance connection to the colour selection electrode, is characterized in that the metal connection strip of the getter comprises a metal contact spring which is in contact with the magnetic screening cone.

It is to be noted that U.S. Patent Specification 3 543 072 discloses a colour television display tube in which a metal contact spring connected to the high voltage contact produces an electric connection with the metal frame of the colour selection electrode. In this known construction the pressure point of the contact spring is moved from the conductive inner coating to the frame of the colour selection electrode so as to avoid damage to the conductive inner coating as a result of mechanical vibration of the contact spring. The conductive inner coating of said known tube, however, does not consist of a resistive layer and the problems for which the present invention provides a solution do not play a part at all. The U.S. Patent Specification furthermore gives no indication whatsoever with respect to the place of the getter in the display tube. In display tubes to which the present invention relates, the resistive layer may have a resistance of at least 100 Ohm per square. Accordingly the place of the getter in the display tube is important. Although for practical reasons the whole inner wall of the tube between the electrode system and the display screen is covered with a resistive layer the part of the resistive layer which is effective for the end in view is mainly restricted to the part thereof extending in the tube neck and over the transition neck-cone. Therefore, this part of the resistive layer may not be covered with the gettering material evaporated from the getter because the gettering material would shortcircuit the resistive layer. For this reason the getter is connected to the high voltage contact by means of the metal connection strip. The invention uses said connection construction advantageously by also providing the connection strip of the getter with a metal contact spring which contacts the metal magnetic screening cone.

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The position of the getter near the high voltage contact is particularly favourable. The gettering material evaporated from the getter is deposited mainly over an area in the proximity of the high voltage contact on the resistive layer and short-circuits the resistive layer at that area. A shortcircuit at that area of the resistive layer does not reduce the action of the resistive layer as a current limiter in the case of a possible electric flash-over in the tube, since, as already said, the part of the resistive layer effective for that purpose is restricted to the neck and the transition neck-cone.

The connection of the getter to the high voltage contact in combination with the contact spring pressing against the magnetic screening cone has practical advantages not only from the constructive point of view but also has proved to provide in addition a very low-resistance connection between the colour selection electrode and the resistance layer, thereby reducing the interference radiation level of the display tube.

According to an embodiment of the invention the magnetic screening cone comprises a slot-like recess and the metal contact spring presses against the edge of said recess. In this manner not only a good electric contact of the spring to the screening cone is obtained but a locking of the connection strip of the getter against a possible rotation around the high voltage contact is also realized.

The invention will be described in greater detail with reference to the accompanying drawings, in which

Fig. 1 is a diagrammatic sectional view of a colour television display tube in accordance with the invention, and

Fig. 2 shows an embodiment of a getter comprising a connection strip and a metal contact spring as used in the display tube shown in Fig. 1.

The vertical sectional view of the tube shown in Fig. 1 comprises a glass envelope consisting of a display window 1, a cone 2 and a neck 3. Electrode system 4 for generating three electron beams 5, 6 and 7 is situated in the neck 3. The electron beams are generated in one plane, in this case normal to the plane of the drawing, and are directed on a display screen 8 which is provided internally on the display window 1 and comprises a large number of phosphor strips luminescing in red, green and blue and whose longitudinal direction is parallel to the plane of the drawing. On their way to the display screen 8 the electron beams 5, 6 and 7 are deflected over the display screen 8 by means of a number of deflection coils 9 placed coaxially around the tube axis and pass through a colour selection electrode 10 consisting of a metal plate having elongate apertures 11 the longitudinal direction of which is also parallel to the plane of the drawing. The three electron beams 5, 6 and 7 pass through the apertures 11 at a small angle with each other and consequently each impinge

only on phosphor strips of one colour. The tube furthermore comprises an internal magnetic screen cone 12 with which the electron beams 5, 6 and 7 are screened from the earth's magnetic field. The inner wall of the tube is covered with an approximately 10 μ m thick resistive layer 13 which consists of a resistive layer consisting of approximately 6 parts by weight of iron oxide (Fe_2O_3), 1 part by weight of graphite and 2.5 parts by weight of potassium silicate. The layer 13 is connected to a high voltage contact 15 provided in the tube wall. The colour selection electrode 10 is connected to the display screen 8 via contact springs 16, while the last electrode 14 of the electrode system 4 is connected to the resistive layer 13 via contact springs 17.

The outer wall of the cone 2 is covered with a readily conductive coating 18 which consists mainly of graphite. The resistive layer 13 and the coating 18 constitute a capacitor with the glass of the cone 2 inbetween as a dielectric, which capacitor serves as a smoothing capacitor for the high voltage. As is known, after evacuating the tube, a layer of gettering material of, for example, barium, strontium, calcium or magnesium is deposited in the tube so as to getter residual gases which have remained in the tube. A getter 19 from which said gettering material is released by inductive heating is detachably connected to the high voltage contact 15 by means of a metal connection strip 20. As shown in the enlarged detail of Fig. 1, the high voltage contact 15 comprises for that purpose a conically widening pin 21 cooperating with a slotted hole 22 in the strip 20. As shown in Fig. 2 the slotted hole 22 consists of a wide aperture 23 and a narrow aperture 24. For the connection the wide aperture 23 is moved over the pin 21 and the pin 21 is then inserted in the aperture 24 by moving the strip 20. Due to the resilience of the slightly pre-bent strip 20 the latter presses, at the area of the aperture 24, against the conically widening pin 21 with which the coupling of the strip 20 and the pin 21 is produced. Instead of a detachable connection, the strip 20 may alternatively be secured to the high voltage contact permanently, for example by spot-welding. A metal contact spring 25 is welded to the connection strip 20. The contact spring 25 presses against the edge 27 of a slot-like recess 26 provided in the magnetic screening cone 12. In this manner a direct electric connection between the magnetic screening cone 12 connected electrically to the colour selection electrode 10 and the high voltage contact 15 is produced. In this construction the possibility of any rotation of the connection strip 20 about the pin 21 is also prevented. With the construction described a reduction of the radio interference radiation level by at least 10 dB is realized as compared with a tube in which the magnetic screening cone electrically contacts the resistive layer in a

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usual manner by means of contact springs spot-welded thereto.

Claims

1. A colour television display tube comprising an envelope having a neck, a cone and a window portion, an electrode system provided in the neck to generate at least two electron beams, a display screen provided internally on the window portion, a colour selection electrode which is situated at a short distance from the display screen, an electric resistive layer provided on an internal wall part of the envelope situated between the electrode system and the display screen, a high voltage contact provided in the envelope between the electrode system and the display screen and being connected electrically with the resistive layer, a getter which is attached to the high voltage contact by means of a resilient metal strip, and a magnetic screening cone extending within the cone and including a low-resistance connection to the colour selection electrode and the resistive layer, characterized in that the metal connection strip of the getter comprises a metal contact spring which contacts the magnetic screening cone to provide the said low resistance connection.

2. A colour television display tube as claimed in Claim 1, characterized in that the magnetic screening cone comprises a slot-like recess and the metal contact spring presses against an edge of the recess.

3. A television receiver including a display tube as claimed in Claim 1 or 2.

Revendications

1. Tube d'images de télévision en couleur muni d'une enveloppe comportant un col, un cône et une fenêtre un système d'électrodes appliqué dans le col et servant à engendrer au moins deux faisceaux d'électrons, un écran d'image appliqué sur la face intérieure de la fenêtre, une électrode de sélection des couleurs située à courte distance de l'écran d'image, une couche de résistance électrique appliquée sur la partie de la paroi intérieure de l'enveloppe entre le système d'électrodes et l'écran d'image, un contact à haute tension appliquée dans l'enveloppe entre le système d'électrodes et l'écran d'image et connecté électriquement à la couche de résistance, un fixateur de gaz (getter) fixé au contact à haute tension à l'aide d'une bande métallique élastique, et un cône de blindage magnétique connecté à l'électrode de

sélection des couleurs et s'étendant à l'intérieur du cône et comprenant une connexion à faible résistance avec l'électrode de sélection des couleurs et la couche de résistance, caractérisé en ce que la bande de connexion métallique du fixateur de gaz est munie d'un ressort de contact métallique assurant le contact avec le cône de blindage magnétique.

2. Tube d'images de télévision en couleur selon la revendication 1, caractérisé en ce que le cône de blindage magnétique est muni d'une entaille ou ouverture en forme de fente et que le ressort de contact métallique s'applique contre un bord de ladite ouverture.

3. Récepteur de télévision comportant un tube reproducteur d'images de télévision en couleur selon la revendication 1 ou 2.

Patentansprüche

1. Farbfernsehröhre, bestehend aus einem Kolben mit einem Hals, einem Konus und einem Frontglas, einem in dem Hals angeordneten Elektrodensystem zum Erzeugen mindestens zweier Elektronenstrahlen, einem auf der Innenseite des Frontglases angebrachten Bildschirm, einer in geringer Entfernung von dem Bildschirm liegenden Farbauswahlelektrode, einer elektrischen Widerstandsschicht, die auf einem zwischen dem Elektrodensystem und dem Bildschirm liegenden inneren Wandteil des Kolbens angebracht ist, einem in dem Kolben zwischen dem Elektrodensystem und dem Bildschirm angebrachten Hochspannungskontakt, der elektrisch mit der Widerstandsschicht in Verbindung steht, einem Getter, der mittels eines nachgiebigen Metallstreifens an dem Hochspannungskontakt befestigt ist und einem sich innerhalb des Konus erstreckenden magnetischen Abschirmkonus, der eine Verbindung niedrigen Widerstandes mit der Farbauswahlelektrode und der Widerstandsschicht enthält, dadurch gekennzeichnet, dass der metallene Befestigungsstreifen des Getters eine metallene Kontaktfeder enthält, die mit dem magnetischen Abschirmkonus in Kontakt steht, um die genannte Verbindung niedrigeren Widerstandes zu erhalten.

2. Farbbildröhre nach Anspruch 1, dadurch gekennzeichnet, dass der magnetische Abschirmkonus mit einer schlitzförmigen Aussparung versehen ist und die metallene Kontaktfeder gegen einen Rand der Aussparung drückt.

3. Fernsehempfänger mit einer Bildwiedergaberöhre nach Anspruch 1 oder 2.

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