

The present invention relates to a device for the correction of the deflection effect due to a variation of the focusing voltage in a trichromatic cathode-ray tube having cathodes in line.

It has been found that in trichromatic cathode-ray tubes, of the type incorporating a gun including a prefocusing lens and a principal lens, that is to say composed, in total, of five or six grids in general, when the focusing voltage is caused to vary, changing for example from 8 to 10 kV, the position of the spots corresponding to the colours red and blue is modified, for the illumination of the same luminophores. This phenomenon has been detected in the course of tests of alignment of the gun (which are known under the name FRAT, that is to say Focus Raster Alignment Test). This modification of the position of the spots has an unfavourable effect on the convergence.

In order to remedy this effect, a modification is made to the shape of the grid 2, which is then referred to as "G2 with FRAT fixed", by pressing its central part. This pressing causes an inevitable deformation of the plane surfaces of the grid, having an unfavourable effect on the astigmatism of the tube; this necessitates an increase in the focusing voltage necessary in order to compensate for this phenomenon.

The subject of the present invention is a device for the correction of the aforementioned effect, not necessitating any modification of G2, which remains plane, being a device which is simple and involves little difficulty in operation.

The device according to the invention, for a trichromatic cathode-ray tube having aligned cathodes, is a gun, the extreme holes of the fourth grid of which, corresponding generally to the colours red and blue, exhibit differences of characteristics, in relation to their centres of origin, between their peripheral portions facing the central hole (corresponding to the green) and the remainder of their periphery.

This difference of characteristics may be a difference of shapes, or of thickness, or of level in relation to the general plane of the grid.

5 The present invention will be better understood on reading the detailed description of a plurality of embodiments, which is illustrated by the accompanying drawing, in which:

- Figure 1 is a plan view of a preferred embodiment of G4 according to the invention, and

10 - Figures 2 and 3 are cross-sectional views of two other embodiments of G4 according to the invention.

The invention relates to trichromatic cathode-ray tubes of the type having a gun including a prefocusing lens (grids 1 to 4 generally) and a principal focusing lens (grids 5, and 6 where appropriate, generally), and
15 three emission cathodes disposed in line.

In order to compensate for the aforementioned phenomenon observed in the course of FRAT tests, the present invention provides for the modification of the
20 fourth grid G4, and not the second G2, which remains plane, without modifications of compensation of this phenomenon. The Applicant has found that modifications of the grid G4 were easier to carry out and involved a smaller risk of unfavourably affecting its conventional
25 properties, than was the case for modifications of G2.

In the three embodiments of the invention which are shown in the drawing, the starting point is a grid G4 of conventional shape. As shown, for example, in Figure 1, this fourth grid, bearing the reference 1, of oblong
30 shape, includes originally three circular holes 2, 3, 4 which are aligned and equidistant, for the passage of the electron beams, the function of which is to illuminate the red, green and blue luminophors, respectively, of the trichromatic cathode-ray tube of which this grid 1 forms
35 part.

In Figure 1, the extreme holes 2 and 4, which are originally circular, have been shown in broken lines in their extreme portions, that is to say their semi-circular parts which are the furthest from the central

hole 3.

According to the invention, the holes 2 and 4 are enlarged in the direction of the longitudinal axis of the grid 1, in the direction of its ends, in such a manner as to obtain oblong holes 5, 6 corresponding to a "translation" over a distance d , along the said longitudinal axis, of the holes 2 and 4 respectively. It has been found that, for different cathode-ray tubes, and for a focusing voltage within the range between approximately 8 and 10 kV, this distance d should be generally within the range between approximately 0.1 and 0.2 mm in order to permit the correct compensation for the said phenomenon. According to a preferred embodiment, for a gun having six focusing grids, and a focusing voltage of approximately 8 kV, the value of d is approximately 0.13 mm. In practice, this distance d is determined following two tests, for example a test at 0.10 mm and another at 0.20 mm, the value of the optimal distance being obtained by linear extrapolation or interpolation. If the value computed in this manner were outside the chosen range, it would be possible to carry out a third confirmatory test with a distance d equal to the value computed by extrapolation.

According to the embodiment of Figure 2, the starting point is a fourth grid 7 of conventional shape, including the three conventional holes 8, 9, 10. There is fixed, by any appropriate means, on the lower face (that is to say the face turned towards the cathode) of the grid 7, a rectangular plate 11 of width equal to that of the grid 7, and of length approximately equal to the centre-to-centre distance of the holes 8, 10 (those corresponding to the red and to the blue). The plate 11 and the grid 7 may be constructed with the same material and may have approximately the same thickness. The plate 11 being centred in relation to the grid 7, there are counterbored in the plate 11 a central hole in extension of the hole 9, and two half-holes in extension of the holes 8 and 10. The fine adjustment of the action of the plate 11 may be carried out by varying its length and/or

its thickness. Naturally, instead of adding a plate such as the plate 11, it is possible to proceed from a grid of greater thickness and to reduce the thickness of its ends.

5 The grid 12 shown in Figure 3 is, at the start, a grid of conventional shape, the rounded ends 16, 17 of which are countercranked towards the cathode, the countercracking being undertaken substantially at the level of the centres of the extreme holes 13, 15. The
10 fine adjustment of the correction applied by the grid 12 is undertaken by varying the amplitude of the countercracking, which is approximately equal to the thickness of the grid 12.

15 For the two embodiments of Figures 2 and 3, the optimal values of the parameters (dimensions of the grid 11 or amplitude of the countercracking of the grid 12) are obtained by linear extrapolation or interpolation from two substantially different values which are close to the mean value indicated hereinabove.

CLAIMS

1. Device for the correction of the deflection effect due to a variation of the focusing voltage in a trichromatic cathode-ray tube having cathodes in lines, of the type comprising five or six focusing grids, the first four grids of which constitute a prefocusing lens, with a plane second grid and an oblong fourth grid comprising three aligned holes, characterized in that the extreme holes (2, 4-8, 10-13, 15) of the fourth grid (1, 7, 12) exhibit differences of characteristics between their peripheral portions facing the central hole of the grid and the remainder of their periphery, in relation to their centre of origin (5, 6-11-16, 17).
2. Device according to Claim 1, characterized in that the extreme holes (2, 4) are enlarged in the direction of the longitudinal axis of the grid, in the direction of its ends, in such a manner as to obtain oblong holes (5, 6).
3. Device according to Claim 2, characterized in that the extreme holes are enlarged over a depth (d) within the range between approximately 0.1 and 0.2 mm.
4. Device according to Claim 1, characterized in that the difference of characteristics is a difference of thickness (11).
5. Device according to Claim 4, characterized in that the difference of thickness is obtained by fixing on the central part of the grid a plate (11) of the same width as that of the grid and the length of which is substantially equal to the centre-to-centre distance of the extreme holes, holes being counterbored in this plate, in extension of the holes (8, 9, 10) of the grid.
6. Device according to Claim 4, characterized in that the difference of thickness is obtained by reduction of thickness of the ends of the grid.
7. Device according to Claim 1, characterized in that the difference of characteristics is a difference of level in relation to the general plane of the grid (16, 17).



8. Device according to Claim 7, characterized in that the difference of level is obtained by counter-cranking of the rounded ends of the grid (16, 17), substantially at the height of the centres of the extreme holes of the grid.

