

[54] **COLOR CATHODE RAY TUBE MAGNETIC POLE PIECE SUPPORT STRUCTURE**

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[58] Field of Search **313/417, 412, 413, 414,**
313/409, 428, 441

[56] **References Cited**

UNITED STATES PATENTS

3,548,249	12/1970	Yoshida et al.....	313/411 X
3,728,569	4/1973	Gerritsen	313/412

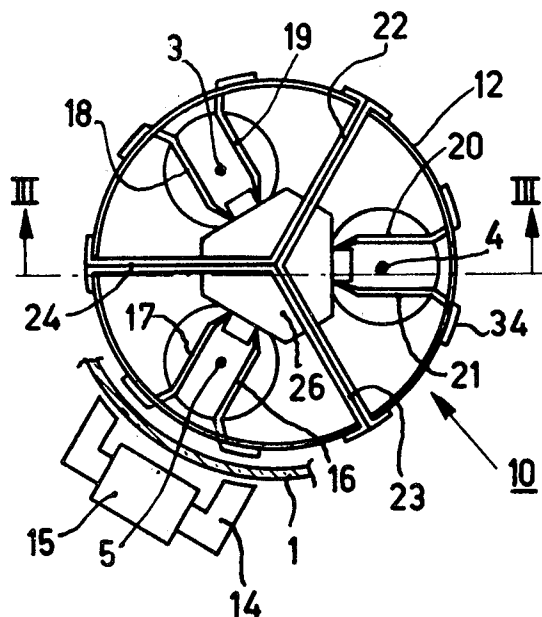
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[57] **ABSTRACT**

The free ends of pairs of magnetic pole shoes of an internal convergence unit in a color CRT resiliently abut against spacing lugs.

3 Claims, 5 Drawing Figures



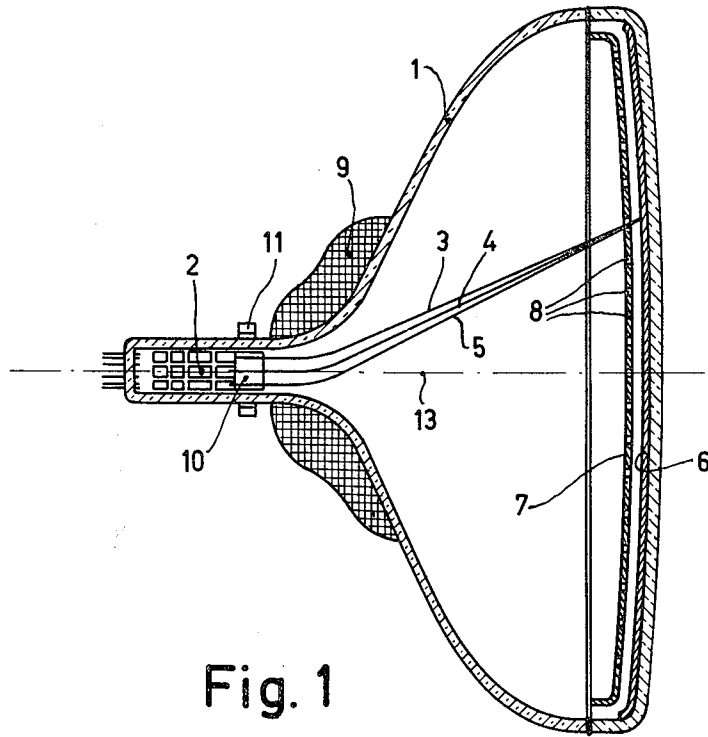


Fig. 1

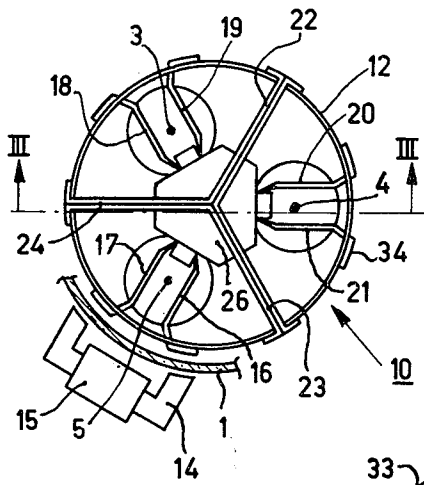


Fig. 2

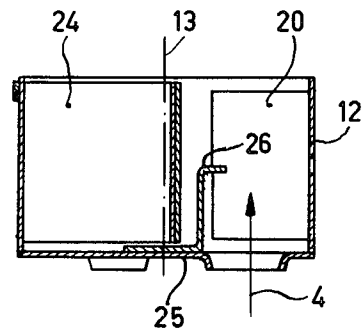


Fig. 3

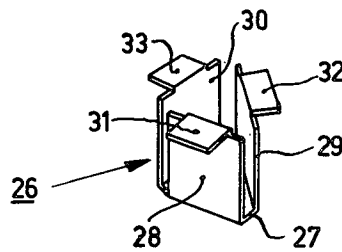


Fig. 4

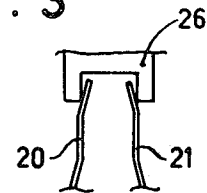


Fig. 5

COLOR CATHODE RAY TUBE MAGNETIC POLE PIECE SUPPORT STRUCTURE

The invention relates to a cathode-ray tube for displaying colored pictures and comprising in an evacuated envelope means to generate a number of electron beams, a display screen comprising a large number of regions luminescing in different colors, a color selection electrode having a large number of apertures, and means to converge the electron beams on the display screen, which electron beams each are assigned to luminescent regions of one color by means of said color selection electrode, said convergence means comprising a cylindrical sleeve to which are secured a number of pairs of ferromagnetic pole shoes extending radially inwards.

Such a cathode-ray tube is known from the U.S. Pat. No. 3,643,121. With the magnetic field which can be produced between each pair of pole shoes of the internal convergence unit by means of an external convergence unit which is situated outside the envelope of the tube and cooperates with the pole shoes, the relevant electron beam can be slightly deflected in a radial direction. This is carried out in such manner that the electron beams intersect each other substantially in one point at the area of the display screen. The simple construction of the internal convergence unit known from the said patent specification, however, suffers from the drawback that the distance between the pole shoes of one pair is not determined sufficiently accurately.

It is the object of the invention to mitigate this drawback and to provide a construction of the internal convergence unit in which the distance between the pole shoes is fixed in a very simple manner.

According to the invention, a cathode ray tube of the type mentioned in the first paragraph is characterized in that means are present to fix the inwardly directed ends of the pole shoes, which means are preferably such that the inwardly directed ends of the pole shoes are pressed against a support under the influence of the resilience of the pole shoes. Said support is preferably manufactured from one piece and comprises a central portion which is secured to a base plate of the said cylindrical sleeve, and a lug which is bent in the axial direction for each pair of pole shoes.

The invention will be described in greater detail with reference to the accompanying drawing, of which:

FIG. 1 shows a cathode-ray tube for displaying colored pictures according to the invention,

FIG. 2 is an elevation of the internal convergence unit of said tube,

FIG. 3 is an axial cross-sectional view of said internal convergence unit,

FIG. 4 shows supporting means for the ends of the pole shoes and

FIG. 5 explains an alternative method of supporting.

The cathode-ray tube shown in FIG. 1 for displaying colored pictures is of the shadow mask type and comprises: an evacuated glass envelope 1, a set of electron guns 2 in triangular arrangement for producing three electron beams 3, 4 and 5, a display screen 6 comprising a large number of phosphor dots luminescing in red, green and blue, respectively, a color selection electrode 7 having a large number of apertures 8, and a set of deflection coils 9 for scanning the display screen 6 with the electron beams 3, 4 and 5. The electron beams

3, 4 and 5 are converged on the display screen 6 by means of an internal convergence unit 10 and an external convergence unit 11. The internal convergence unit 10 comprises a cylindrical sleeve 12 which is coaxial with the axis 13 of the tube.

FIG. 2 is an elevation of the internal convergence unit 10 viewed from the side of the shadow mask 7. The cooperation of the internal convergence unit 10 with the external convergence unit 11 is shown diagrammatically with an external magnetic circuit 14 having a coil 15. A current through the coil 15 produces a magnetic field between the pole shoes 16 and 17 which causes a radial displacement of the electron beam 5. The electron beam 3 is influenced in the same manner by the field between the pole shoes 18 and 19 and the electron beam 4 is influenced by the field between the pole shoes 20 and 21. In this manner the electron beams 3, 4 and 5 can be converged in a point on the display screen 6. The pairs of pole shoes are screened relative to each other by ferromagnetic partitions 22, 23 and 24. The cylindrical sleeve 12 has a base plate 25 which comprises three apertures for passing the electron beams 3, 4 and 5.

FIG. 3 is a cross-sectional view for further explanation of the construction taken on the plane III—III of FIG. 2.

The ends of the pole shoes are kept spaced apart by a support 26 which is stamped from one piece and which is shown in detail in FIG. 4. The pole shoes are not secured to the support 26 but are pressed against it as a result of their own resilience. The support 26 comprises a central portion 27 which is spotwelded to the base plate 25 and three lugs 28, 29 and 30 which are bent in an axial direction and have bent ends 31, 32 and 33 for keeping the pole shoes spaced apart. The resilience of the pole shoes may of course also act in the opposite direction as is shown in FIG. 5.

The pole shoes 16, 17, 18, 19, 20 and 21 project through slots in the cylindrical sleeve 12 and have bent ends (for example, 34 for pole shoe 21) which are secured to the sleeve 12 by means of spot welds. In the known construction the distance between the pole shoes of one set was determined entirely by the accuracy with which the end 34 had been bent. In the construction according to the invention the distance is determined only by the support 26 which can be punched with great accuracy. Nevertheless the pole shoes need be welded only to the cylindrical sleeve 12 so that the simplicity of the construction is maintained.

Although the invention has been explained with reference to a tube having three electron guns in triangular arrangement, the invention is, of course, not restricted to such a tube. If, for example, the three electron guns are situated with their axes in one flat plane the invention can also be used in which, for example, only pairs of pole shoes are present for the two extreme beams.

What is claimed is:

1. A cathode-ray tube for displaying color pictures comprising an evacuated envelope and, within said envelope, means to generate a plurality of electron beams, a display screen having a plurality of regions luminescing in different colors, a color selection electrode having a plurality of apertures to assign each electron beam to luminescent regions of one color, convergence means including a cylindrical sleeve, a plurality of pairs of ferromagnetic pole shoes secured to said sleeve and extending radially inwards to con-

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verge the electron beams toward the display screen, means to magnetically screen said pairs of pole shoes from each other, and spacing means abutting against the free ends of each pair of said pole shoes to fix the space therebetween.

2. A cathode-ray tube as claimed in claim 1 wherein said sleeve is provided with a base plate, said spacing

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means including a support having a central portion secured to said base plate and a plurality of lugs projecting between the free ends of respective pairs of pole shoes.

3. A cathode-ray tube as claimed in claim 2 wherein said pole shoes resiliently press against said lugs.

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